amateur radio

VOL. 45, No. 9 SEPTEMBER 1977

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COVER PHOTO

Bruce Bathols VK3UV, the Editor of AR, is sometimes able to find time to operate on the amateur bands. Bruce is a relative newcomer to amateur radio, being first licensed in November 1971. He has been a member of the Publications Committee since early 1972. The antenna system is a 4-element monoband Yagi on 20 metres (inset), and a homebrew multi-band dipole system for the other HF bands.

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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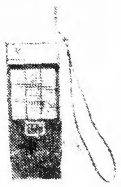

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amateur radio

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QSP — REQUIEM

We have lost a frequency band — temporarily, we are told. All amateurs voice alarm when any privilege is lost; whether or not they themselves used that privilege to any appreciable extent is immaterial.

As has already been reported last month the Institute has been active in seeking adequate compensation for this loss. With this must be linked the staffing position of the Department.

The new Novice segment on 10 m is one spin-off. A letter was sent to the Department about Third Party privileges for radio amateurs. Additional frequency allocations form part of the WARC 79 negotiations by the WIA. The text of the Institute's submissions is printed in full elsewhere in this issue.

The Institute's attitude to CB was reached after consultation amongst all Divisions and represents the view of the majority. However, the whole matter raises the question of whether other amateur frequencies are vulnerable to "strong arm" pressure groups in Australia. ITU and WARC 79 must be considered a special case in their own right.

Membership in a strong WIA is the only hope for the future of radio amateurs in Australia. A weak Institute has little bargaining power and an ineffective lobby.

That is one message for us all.

The second message really need not be spelt out. If you have any complaints take them to your Division. Tell the WIA about them.

Please remember, we are not running a dictatorship. The Institute arrives at a collective decision based on what the membership wants.

D. A. WARDLAW VK3ADW,
Federal President. ■

WIRELESS INSTITUTE OF AUSTRALIA

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Broadcasts— 1825, 3600, 7135 kHz — also on 6m, 2m SSB and 2m Ch. 2 repeater: 00.30Z (Also on Radio 3HA).

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PETER SCHULZ, VK2ZXL

WIANEWS

The main news is published elsewhere in this issue, namely, a consolidated list of the numerous items the Institute has submitted to the Postal and Telecommunications Department.

This sets out the fears expressed about amateur bands in the future, apprehensions about the staff shortages in the Department, and various submissions for streamlining the system.

On the question of frequency allocations the reader of AR will be aware of the preparations being made for WARC 79 and what the Institute, in collaboration with IARU, have put forward. These details, perhaps forgotten by many people, were broadly set out on page 28 of AR for July 1975 (please note the "400" therein was a typographical error for 4000). Please see IARU News herein for further details.

At the July Executive meeting suggestions coming forward from various sources were examined but no decisions could be reached in the absence of policies from the Federal Council. Increased power for Novices was one such item. Another related to the amount of pressure the Institute deemed desirable in relation to additional HF frequencies. It was agreed to proceed with the submission for additional 2 m repeater channels via a postal vote.

The proposals put forward by the VK4 Division for recommended conversion frequencies to the 10 m band for Novices' channelised 11 metre gear were considered as the most acceptable and will go forward as a postal vote to Divisions. Basically this means that the 23 Novice channels be directly translated upwards by 1.335 MHz. Thus the 11 m band Ch. 1 becomes 28.3 MHz, Ch. 2 becomes 28.31 MHz and so on. On some sets tested in VK4, changing only one row of crystals provides the 6 primary frequencies on USB and AM (LSB is not used on 10m) of 28.3, 28.35, 28.4, 28.45, 28.5 and 28.55 MHz and also results in minimising spurious emissions in some cases. This is considered better than changing vertical column frequencies as 28.3, 28.31, 28.32, 28.34 in the first column and so on for the 6 columns (27.235 to 28.57) and 28.6 omitted because USB would be outside the Novice segment. It appears reasonable to anticipate that this postal motion will be passed.

On 27th June a letter was addressed to the P. and T. Department pointing out the concern felt by the Institute for many years about the absolute prohibition on third party traffic, particularly the effect of this on training for, and involvement in, emergency situations. It was pointed out that the basis of Government policy had always appeared clear, namely, the protection of revenue in the preservation of its own monopoly of communications.

But this must now be assumed to have changed by the introduction of the CB service acknowledging the needs and desires of a section of the community being given priority. The change is welcomed because if it can be extended to the amateur service it will enable that service to play an even more meaningful role in the community by gaining experience in message handling on behalf of others.

Not desiring to move away from the amateur service definitions in the ITU Radio Regulations, the Institute suggested that in the flow-on from the decisions already made, it proposes that a regulation similar to the FCC's 97.114 should be adopted in Australia as a matter of urgency.

The letter concluded with the comment that the adoption of this course would play a significant part in minimising conflict between the Department and amateur licensees, since this had been the basic cause of so many past disputes.

As a matter of interest, FCC regulation 97.114 deals with third party provisions applicable in the U.S.A. International third party traffic is prohibited between the U.S.A. and any country which has not agreed to such traffic for its amateurs — i.e. Australia, etc. ITU Radio Regulation 1562 allows third party amateur traffic to be conducted between countries for which the administrations concerned have made special arrangements.

Another letter to the Department in July dealt with beacons in the 10 m band. ■

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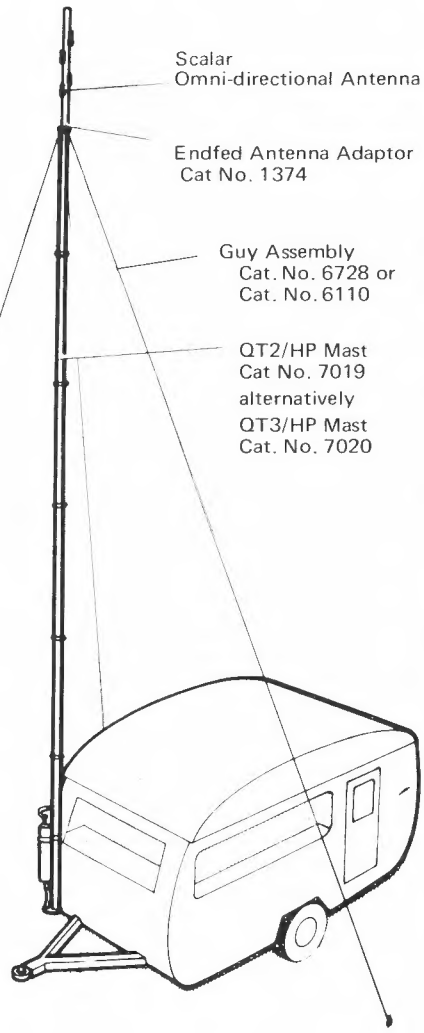

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A LOW COST VIDICON AMPLIFIER

Andrew Pierson,
1 Bindana Ave., Salisbury Park 5109

For the home-brew ATV enthusiast this article will be a very helpful reference regarding the parameters involved in video amplifier design and their importance in the easily-reproducible amplifier described.

At present, many television cameras are in the process of construction by amateurs, and also by others with no direct amateur radio interest. The uses to which these cameras will be put are very diverse, varying from straightforward closed circuit television to use with an ATV transmitter on UHF or microwaves. The current popularity of amateur slow scan techniques has generated a new demand for the CCIR standard TV camera, because the setting up procedure is less arduous than with a direct slow scan unit. The fast scan pictures may then be converted to the slow scan format by a simple sampling process.

Although commercial cameras (usually employing the 2/3 inch vidicon, and of Japanese origin) are readily available, the price tag of between $200 and $500 is fairly steep. Consequently, many people have decided to "brew their own", and learn something about TV in the process. Everyone who attempts this, however, finds himself somewhat of a "loner" because of lack of standardization in deflection assemblies, etc. The precise circuit each constructor chooses will therefore depend on which deflection yoke he has managed to beg, buy, cadge or (brave man!) wind himself. There are also a fair number of circuits around which specify components and circuit configurations that have since become obsolete. One of the worst examples of this has been that of the vidicon amplifier (sometimes referred to as the "head" amplifier). More often than not, the transistors which are specified are expensive and difficult to obtain. Also, the older transistor circuits often exhibit poor S/N ratios, which does not help the man who is trying to achieve a reasonable picture indoors under normal lighting conditions whilst using a modest lens. A vidicon obtained because it has "done its hours" will probably be down in sensitivity, which is not going to help matters.

Whilst it is easy to specify exotic transistors for vidicon amplifier designs, it is also possible to utilise devices like the humble BC109, which for its 20 cents or less gives you low noise performance, high current gain and an FT of 300 MHz. Used properly, I reasoned that this and similar devices could be employed in a very low cost good quality vidicon amplifier. With these facts in mind, I set about designing and building an amplifier specifically for amateur television purposes, and which would satisfy the following requirements:—

(1) Low cost
(2) Easy-to-obtain components
(3) Simple circuitry
(4) Good bandwidth (resolution)
(5) Low noise performance
(6) Stable performance
(7) Easily reproducible
(8) Simple to set up
(9) Plenty of reserve gain for low-output vidicons.

I am very happy to say that these aims have been achieved, and in fact, two designs were produced. The first is presented here, and represents the simple, low-cost approach to a vidicon amplifier. The second design uses more components, but provides ultra low noise performance (FET output), and also facilities for line-by-line clamping, signal blanking, sync insertion and a 75 ohm cable driver output. This more sophisticated circuit will be the subject of a later article.

The circuit shown (Fig. 1) is that of the low cost (Mk I) design, and is the result of the initial work carried out. The amplifier uses four BC109's and two 2N3638A's, which can be bought anywhere; the remaining components are only R's and C's. Before continuing with the circuit description, the basic operating principles and requirements for a vidicon ampilfier will be briefly discussed.

PRINCIPLES OF OPERATION

The signal output circuit via the photoconductive target of a vidicon has a characteristically high impedance, and behaves essentially as a constant current source. Operating bias must be applied to the target from a positive DC potential, and is supplied via the target load resistor. The video signal voltage will therefore be developed across this resistance. Since the current is essentially constant, the larger the value of load resistor the greater will be the amplitude of the developed video signal. This should make the amplifier design easy, but this is not so because another factor lurks — the target shunt capacity and also that capacitance introduced by wiring, together with the input circuit of the amplifier. These will total about 10 to 20 pF. If a high value of load resistor is employed (say 1 Megohm), the shunting effect of these capacities will be very serious at the top end of the video spectrum being produced. (Generally speaking, an industrial camera will produce frequencies of up to about 5 MHz and a studio camera up to about 10 MHz, although there are exceptions in both cases). The roll-off will have the simple slope of 6 dB/octave or 20 dB/octave, and must be compensated for in the amplifier by introducing a characteristic with an equal but opposite amplitude Vs frequency slope.

The alternatives now become clear. A low band load resistor will produce a low level signal which means that the wide band voltage gain of the amplifier must be high. However, due to the fact that capacitive losses are minimised, the amount of compensation required will be small. On the other hand, a high value load resistor will produce a large signal which requires little low frequency amplifications, but due to the high capacitive losses involved the amount of compensation required will be great.

The initial consideration in any vidicon amplifier design is generally a trade-off between the factors just outlined. The low value load resistor approach gives more flexibility in use, since a change in shunt C will not have such a drastic effect on the overall compensation requirements. A disadvantage is that the internal noise produced by the amplifier is spread further over the whole video frequency spectrum than in the case of a high value load resistor, where most of the amplifier gain is concentrated towards the high frequency end. A given RMS value of low frequency noise is much more objectionable than the same RMS value of high frequency noise, since it results in intermittent "streaking" rather than the usual fine speckly "snow". The high value load resistor wins on this point, but if the value is made too large the amount of compensation then required results in excessive high frequency noise. Also, the amplifier's compensation characteristic will have to be altered if for any reason the overall shunt capacity is changed (e.g. a vidicon replacement). Note that the effective signal load impedance may not necessarily be equal to the value of the physical target load resistor, because the input impedance of the amplifier will appear in parallel with this resistor, as far as the AC coupled video signal is concerned.

CIRCUIT DESCRIPTION

In the amplifier design presented, a "medium" value of video load resistor has been chosen, in order to balance the benefits obtainable from both approaches. The input circuit of the amplifier proper (Q3-Q6) has been buffered from the target load circuit by means of the super-alpha pair (Q1-Q2), so that the actual video load impedance is approximately 100 k ohms (the first emitter follower's bias feed resistor) in parallel with 470 k ohms (the target bias feed resistor).

The target bias voltage is supplied via a 100 k ohm resistor, and a 100 nF capacitor to ground forms a low pass filter to ensure that no spurious signals are passed to the amplifier via the target bias voltage supply.

The bias divider for Q1 is decoupled with a 100 uF electrolytic and a 100 nF Hi-K ceramic capacitor, which serves as a bypass at high frequencies where the inductive effects of electrolytics may tend to become troublesome.

Q3 is a DC coupled common emitter, compensated amplifier stage with a DC/LF gain of 20 dB. Adjustable low frequency (smear) compensation is applied by emitter regeneration to Q3.

Q4 is a DC coupled phase reversing stage with a DC/LF voltage gain of 1. However, this arrangement leaves the remainder of Q4's current gain available for high frequency compensation, again applied by means of emitter regeneration.

Q5 is a DC coupled common emitter amplifier stage with a DC voltage gain of 1. but the wide band AC gain is set by the emitter decoupling network consisting of a 47 ohm resistor and a 1000 uF electrolytic capacitor. Under these conditions, the wide band AC gain is given by the ratio

$$\frac{470\ (470 + 47)}{470 \times 47} \text{ or } 11.0$$

The above relationship does not take into account minor loading effects due to the input impedance of the emitter follower stage Q6.

Q6 is a DC coupled emitter follower output line driver stage. Under quiescent conditions, the DC voltage appearing at the emitter of Q6 is +10V, and the overall amplifier +12V rail drain is 50 mA. These figures will vary between individual unit samples, due to spreads in transistor parameters and resistor tolerances. A variation of ±500 mV from the nominal +10V at the emitter of Q6 would be permissible, and a check of the voltage at this point is a quick and convenient method of determining if the amplifier's DC operating conditions are normal. The dissipation requirements of Q6 are minimised by including two 100 ohm series resistors in its collector circuit. Sufficient voltage is still maintained across Q6 to provide an adequate output voltage swing. The emitter circuit of Q6 is decoupled from the rail by a 10 ohm resistor and a 1000 uF electrolytic capacitor. An additional 100 nF Hi-K ceramic capacitor is connected across the large value bypass to maintain decoupling at high frequencies. The maximum output of the amplifier is 1V p-p from blanking level to peak white, which is positive-going.

In the days of valve camera chains, the large physical size of the equipment made it necessary to place in the camera head only that circuitry which was absolutely essential for its operation. The remainder of the circuitry was contained in the camera control unit, located at some distance from the camera and connected to it via a multi-core cable. Under these circumstances, the output of the vidicon amplifier was required to drive a coaxial cable. However, the advent of transistorised equipment has largely meant the demise of the two-unit camera, since all of the circuitry may be located in the camera unit itself. And so it is that the output circuit of the modern vidicon amplifier has generally a higher impedance, because the sync assembly circuit which it feeds is close by — many times on the same PC cards.

The design of a general purpose amplifier such as described here imposes a few more restrictions on output impedance. because it is likely to be connected to a variety of circuits with differing impedances and shunt capacities. Since it is desirable that the compensation characteristics of the amplifier be not influenced by variations in output capacitive loading, the output circuit has been arranged to present a driving impedance of 75 ohms to the connecting cable. Because of this arrangement, the amplifier will drive at least 3 metres of 75 ohm coaxial cable without the need for a terminating resistor at the receiving end. The output is AC coupled via a 100 uF electrolytic capacitor, and will drive circuitry with input impedances of 500 ohms and upwards. The 10 k ohm resistor across the output line has a small value when compared to the leakage resistance of the coupling capacitor, thereby preventing the occurrence of a DC potential at the output terminal when no load is connected.

It will be seen that the use of DC coupling between stages has considerably reduced the cost and complexity of the amplifier by eliminating electrolytic coupling capacitors and bias resistor networks. The main +12V supply rail is bypassed with a 1000 uF capacitor, together with a 100 nF Hi-K ceramic capacitor for the same reasons as described earlier.

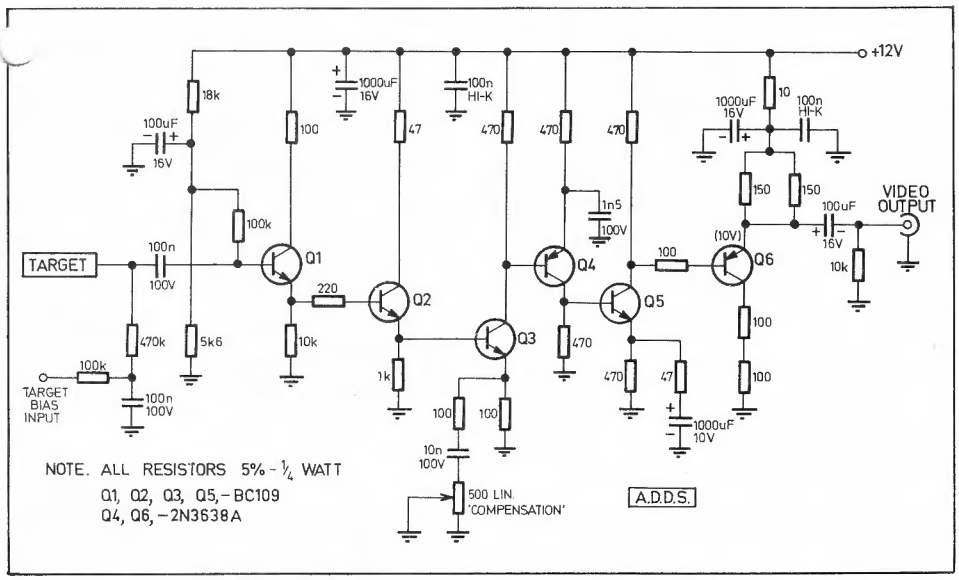

FIG. 1: Schematic of Low Cost Vidicon Amplifier.

CONSTRUCTIONAL DETAILS

The amplifier may be constructed using hard-wired or PC card techniques. Veroboard is also suitable. Whatever the method of construction, two important considerations must be observed if stable performance is to be achieved. The first is that the component placement should be such that the signal progresses logically from left to right, or vice versa. In other words, the isolation between input and output should be at a maximum. The second consideration involves the supply and earth rails. In order to avoid trouble from common impedance paths, the rail conductors should be as heavy as practicable. If you feel doubtful about this aspect, additional 22 uF, 16V tantalum "tag" electrolytics (which have good high frequency characteristics) may be used across the +15V and earth rails at various points throughout the circuitry.

The ideal physical construction for amplifiers of this type is to hard-wire the components between tagstrips inside a die-cast box. However, this circuit is very "tame", and recourse to this action should not be necessary.

COMPONENT TYPES

For the sake of convenience, all resistor values specified are from the E12 series and are easily obtainable, but they should be good quality 5 per cent tolerance, ¼ or ½ watt cracked carbon or metal film types. The compensation adjustment preset potentiometer must have a non-inductive (e.g. carbon) element. All electrolytics are etched aluminium foil types, and the remaining capacitors are split into Hi-K ceramics and polyester film "Greencaps". The BC109's and 2N3638A's may be by any manufacturer, provided that they meet the original specifications for these devices. This is very important, and substitute types should NOT be used.

INSTALLATION

It is imperative that the connection between the vidicon target ring and the input of the amplifier be as short as possible, and that stray capacity to ground be kept to an absolute minimum. Also, the general area surrounding the target and amplifier

input should be shielded to prevent the entry of spurious signals. These two requirements conflict to some extent, so commonsense should be the guide. Try to keep the input lead less than 25 mm long, and at least 5 mm away from all other earthed objects. The lens mounting plate MUST be earthed. If this is not so, RF interference will enter the amplifier by capacitive coupling when the lens is touched during focussing. etc.

ADJUSTMENT PROCEDURE

The compensation adjustment is simplicity itself. At one end of the potentiometer's travel, black objects in the observed picture will give rise to a following black smear. At this position the amplifier's +3 dB "corner" frequency is above the —3 dB corner frequency of the low pass filter formed by the effective load impedance and the total input shunt capacity. Under these conditions, the amplifier is said to be "undercompensated".

At the other end of the potentiometer's travel, black objects will give rise to a following white smear. This indicates that the amplifier is "overcompensated", because its +3 dB corner frequency is below the —3 dB point of the signal input network. The correct potentiometer position is that setting which does not produce any smear at all.

SENSITIVITY

In terms of internally generated noises and overall sensitivity, the performance of the prototype amplifier was very pleasing. When using a normal 1 inch vidicon with a target voltage of +50V, an f1.4 25 mm lens, and an inside scene under fluorescent illumination, the output from the amplifier was 1.5V p-p. The picture was clean and finely graded, displaying excellent amplitude linearity.

NOISE

With a short circuited input, the output noise was 60 mV p-p. However, due to the compensation characteristic of the amplifier this figure is correct only for the upper end of the video frequency spectrum, where it is practically invisible. For lower frequencies, the noise amplitude decreases at the rate of 6 dB/octave.

APERTURE CORRECTION

Whilst amplifier compensation has been discussed at some length, another form of compensation is required when one is seeking the very best from a camera tube. This is termed "aperture correction", and its need arises because the cross section of the scanning beam is not rectangular and infinitely small, but circular and of finite size. The required correction curve has a more complex function than 6 dB/octave, and may be compensated for by using a circuit which possesses a frequency response equal to the inverse of the frequency characteristic produced by the aperture effect. Since the frequency roll-off caused by a symmetrical aperture introduces no phase variation with frequency, the correction circuit should likewise be free from this effect.

Practically, delay line circuits or T-section equalizing networks are used, but a reasonable approximation for aperture correction may be made by increasing the amount of HF amplifier compensation to above that value which will theoretically fully correct the amplifier. In any case, it is not very important, and is only worth worrying about when one is seeking resolution in the 500-800 line region. Few industrial cameras include proper compensation for the aperture effect. I have adopted the "over-compensation" compromise, since it involves less circuit complexity and avoids the necessity for inductances.

Because the final value of equalization is usually arrived at empirically, it is difficult to ascertain the point at which the normal 6 dB/octave compensation leaves off and the additional aperture correction lift takes over. If you are using an average TV receiver for a monitor, it is doubtful whether the difference between this form of aperture correction and that provided by more sophisticated circuits could be detected anyway.

RESOLUTION

The resolution of a television system may be defined as the total number of alternate black AND white vertical bars PER PICTURE HEIGHT which can be discerned when the system is used as a medium for visual image transmission.

The accepted method for determining the resolution of a television camera is to televise a bar chart which contains several sets of vertical stripes which, when placed at a certain distance from the centre, correspond to various increments of resolution or frequency. The resulting video output from the camera is observed on a wide-band oscilloscope or video waveform monitor, and the percentage response at each step is noted.

A more widely used (but not so comprehensive) method is by making use of the resolution wedge, which is an integral part of most standard TV test patterns, e.g. the Marconi Resolution Chart No. 1. By observing the point at which the converging lines disappear, the overall limiting resolution of the camera, transmission system (if used), and monitor may be determined. The method is fast, but does not give any detailed information about the overall frequency roll-off characteristic. Only a few per cent of signal is required to give an indication of wedge line continuity (5 per cent or —26 dB is a popular figure), so if the maximum resolution is judged to be, say, 5 MHz, it means that there is very little signal left at this point, and the roll-off may have commenced several MHz before. It is also a fact that only a small percentage of high frequency signal is required to give an image the appearance of sharpness, so the whole system is quite acceptable. The monitor is also included in the resolution check, which makes it very useful for amateur applications.

The point at which the total signal amplitude as observed on the screen of the monitor falls below the level necessary to observe wedge line continuity depends on the algebraic sum of the following frequency characteristics:—

(1) The output signal from the camera tube target, which also implies:
  (a) Optical focus
  (b) Scanning beam spot size
  (c) Target granularity.

(2) The frequency characteristic of the camera tube amplifier. Neglecting aperture correction, the +6 dB/octave lift from the amplifier will oppose the —6 dB/octave loss from the input circuit. This process will result in an overall flat amplitude Vs frequency characteristic until the amplifier's compensation circuits run out of gain. The response will then fall at a rate of 6 dB/octave, plus the amplifier's roll-off value.

(3) Losses involved in camera processing and transmission.

(4) The frequency response of the monitor's video amplifier.

(5) The spot size of the scanning electron beam in the display CRT.

Because of practical difficulties associated with simulating precisely the target circuit of a vidicon camera tube, a direct specification of the amplifier's amplitude Vs frequency characteristic has been avoided. However, to cut a long story short, if you use a normal 1 inch vidicon in the low voltage beam acceleration mode (approximately +250V to +300V) and a modified TV receiver as a monitor, you can expect to resolve at least 450 lines on the monitor screen. This corresponds to 5.625 MHz, which is well above the transmission bandwidth limit anyway. If you use a 1 inch vidicon in the high voltage beam acceleration mode (approximately +600V to +700V) and a high bandwidth monitor, you can expect much better resolution figures.

LOW FREQUENCY RESPONSE

The capacitive coupling elements employed have a sufficiently long time constant that no appreciable frame (50 Hz) tilt appears on the output video waveform.

GAMMA

This is the final parameter which should be discussed, and is the relationship between the light input to the vidicon target and the corresponding signal current output (transfer characteristic).

Since the object is for the overall television system to be able to reproduce a maximum number of shades of grey, the gamma of the camera tube should exactly complement the gamma of the displaying CRT, which is approximately 2.2. However, a system with an overall gamma of unity produces pictures which have a rather flat appearance. This effect may be offset to a large extent by making the overall gamma slightly greater than unity, e.g. 1.1 or 1.2.

Since the input Vs output voltage characteristic of this amplifier is linear and the gamma value for a vidicon is between 0.5 and 0.6, an acceptable overall gamma figure is achieved without the need for a non-linear correction amplifier. ■

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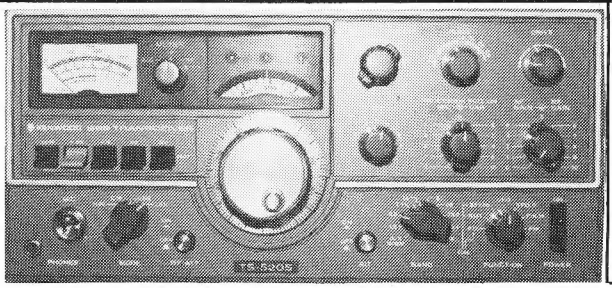

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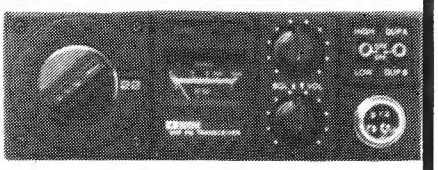

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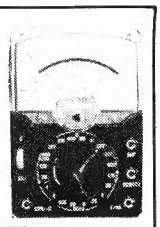

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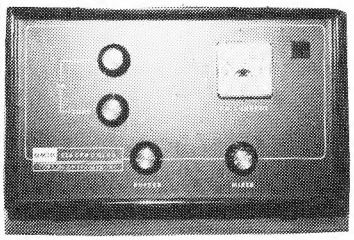

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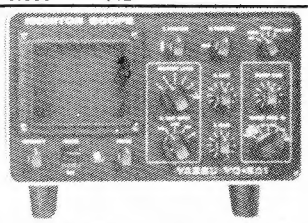

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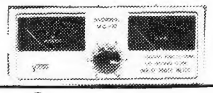

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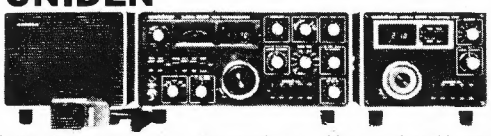

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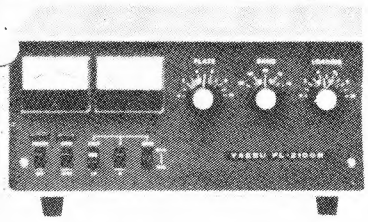

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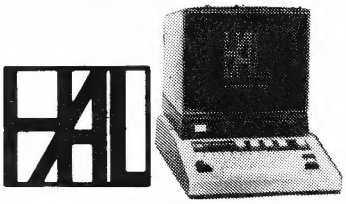

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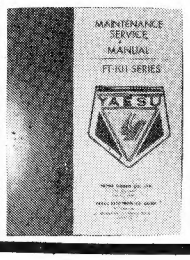

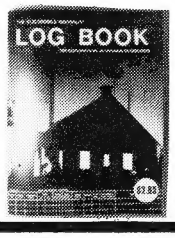

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AN IMPROVED 45 WATT TWO METRE BOOSTER AMPLIFIER FOR FM OR SSB

By Roger Harrison VK2ZTB
and Phil Wait VK2ZZQ

This amplifier originally appeared at the Central Coast Amateur Radio Club Convention in February 1976 and was subsequently described by the authors in the April 1976 issue of ELECTRONICS TODAY INTERNATIONAL, designated "project 710". Its intended purpose was to amplify the output of the many popular two-metre FM transceivers, which generally have an output power of around 10 watts, to a level of 35-45 watts. The amplifier used the then popular 2N6084 RF power transistor, which was at that time readily obtainable and not expensive. The amplifier featured printed inductors and diode antenna changeover switching. Many people have successfully constructed this amplifier, judging by the number encountered on air.

However, some constructors have experienced difficulties with certain shortcomings of the 2N6084. Their minimum gain is specified as 4.5 dB, which means it will only give 28W output for 10W drive under the specified conditions. Raising the supply voltage and drive power improves matters if a min.-gain transistor is encountered but you don't get something for nothing — efficiency is poor. Some transistors proved to have less than their specified minimum gain. Some transceivers also, proved to have less than their specified output power! The occasionally encountered combination resulted in output powers of less than 20W from the amplifier! This caused gnashing of teeth, tearing of hair and cursing of authors !!$?*$*! Ducking tomatoes at radio club meetings is not a habit the authors wish to cultivate.

Another problem arose concerning the combined shortcomings of operators and 2N6084's. Although the 2N6084 is assuredly "rugged" according to the data book, and ". . . resists transistor damage caused by load mismatch", they cannot be treated in a similar manner to valves. Alas, some transistors — and attached bank accounts — have come to grief. It is unwise to apply drive without the power supply connected to the amplifier. Mismatched antennas should likewise be avoided. Some individual transistors "resist" abuse better than others.

Apart from its application with FM transceivers, there were many people desirous of having a linear amplifier, of similar specifications, for use with SSB on two metres. The authors received a number of on-air enquiries as well as a spate of letters on this subject. Attempts to employ the 2N6084 in linear mode, while moderately successful, showed up a few more limitations of the device. Gain in class B (or AB) proved to be less than its gain in class A. Comment on the linearity would likely be defamatory. It is possible, by selecting devices, to construct a passable linear using the 2N6084 but that may prove expensive at around $17 per device!

The solution to these irksome problems is found by modifying the circuit to use a CTC transistor, the B40-12. In actual fact, the modifications are quite minor. The circuit, showing the new configuration and changed components, is given in Figure 1. Linear operation is discussed later.

The B40-12 has a minimum specified gain of 5.5 dB at 175 MHz which results in an output of at least 35 watts from 10 watts drive. Its gain at 146 MHz is higher. Experience shows that B40-12's generally exceed their minimum gain specification. They are rated to withstand an infinite VSWR at full drive with 15.5V supply applied. This makes them somewhat more rugged than the 2N6084. Thus, whilst abuse is not encouraged, open or short circuit antennas and operator mishaps, etc., are not likely to be disastrous, or expensive.

THE DIODE SWITCHING CIRCUIT

The original article specified 10 x 1N914 (or 1N916, or BAX13) diodes for the diode changeover switching circuit. Better diodes are the Philips BAV10 and, as they are adequately rated for the powers encountered, only six are required as shown in Figure 1. Take care when tuning up that you don't short either C5 or C7 as this will cause at least one of the diodes to be overloaded and they will go open circuit (pphhuttangg!!!).

RFC's

The base choke, RFC2, is changed, now consisting of a miniature RFC (of the unencapsulated or the moulded variety — whichever) having a value anywhere from 0.15 uH to 0.27 uH with a 4 x 1.5 x 9.5/F8 Neosid suppression bead slipped over the lead from the RFC to the base of the transistor. This "combination" chow mein . . . er, base choke . . . should be mounted as close to the base as possible — right up at the transistor header.

The collector choke, RFC3, is wound with more turns and is a smaller diameter than that specified for the original circuit.

MISCELLANEOUS COMMENTS

Note that C6, which was a 60 pF trimmer (ELMENCO A4004/OX) is now changed to a higher capacity — the 15-115 pF type (ELMENCO A4006/OX or similar). Any suitable trimmer having a maximum capacitance greater than this however will be satisfactory.

The component layout is exactly the same as in the original amplifier and the general construction and tune-up details remain pertinent.

PERFORMANCE

With the full 10W drive, using a 12.5-13.5V supply, driving a dummy load or well-matched antenna, at least 35W output should be obtainable. Generally, 40-45W would be more usual, and sometimes as much as 50W or so. More can be obtained, but the maximum collector current and maximum dissipation of the B40-12 should not be exceeded. Better efficiency is also more readily achieved with the B40-12 than with the 2N6084.

SSB OPERATION

A simple diode base circuit, as shown in Figure 2 is quite satisfactory. A 1000 pF feedthrough capacitor or ceramic "button bypass" capacitor is mounted on the PC board adjacent to the grounded end of RFC2 to form a "standoff bypass".

The base choke, RFC2, is then mounted between this and the transistor base. The silicon power diode, two ½W resistors and the trimpot may be mounted in any convenient position. If you wish the diode to be thermally connected to the transistor, in order to provide a measure of thermal tracking, it may be glued to the cap of the B40-12. Use a strong, quick-setting glue such as "Bondza" or "Super Glue". This refinement is not all that necessary though.

The diode switching arrangements as configured will not work with SSB. Two changeover relays, operated from the transceiver Tx/Rx circuitry are recommended. Alternatively, a bias network to provide DC bias switching for diodes could be devised to effect fully solid-state changeover switching.

To set up the amplifier for SSB operation, a suitable power meter, power supply (preferably variable current-limited) and a dummy load should be attached. Insert a current meter in the B40-12 collector supply line. The maximum allowable collector current is 7.0 amps. Observe it.

Set the 470 ohm trimpot to maximum resistance initially. Connect the power supply and adjust the trimpot for about 150-300mA of quiescent collector current.

Next, apply a small amount of drive so that there is some increase in collector current and tune C5, C4 and C6, C7 to obtain a peak in the power output. Further increase drive and again peak C4, C5 and C6, C7. If all is going well, apply full drive and peak the trimmers again for maximum power output. About 30-35W PEP minimum should be obtained with 10W PEP drive.

If desired, linearity may be checked by simultaneously monitoring input and output power and making measurements over a range of power levels. The ratio of output to input should remain almost constant until the point where the amplifier begins to flat-top and output compression occurs. That is, an increase in drive power does not cause a corresponding increase in output power.

If you can arrange to listen to your own signal, so much the better. Some adjustment of the quiescent collector current may be necessary to improve linearity. The values quoted provide a starting point. Individual transistors have different characteristics and the collector current is best adjusted in service for best linearity.

Copies of the original article are obtainable from Electronics Today (at 15 Boundary Street, Rushcutters Bay 2001) for 45c per page. The article commenced on page 86 of the April 1976 issue and continued on pages 87 to 91 inclusive (six pages). ■

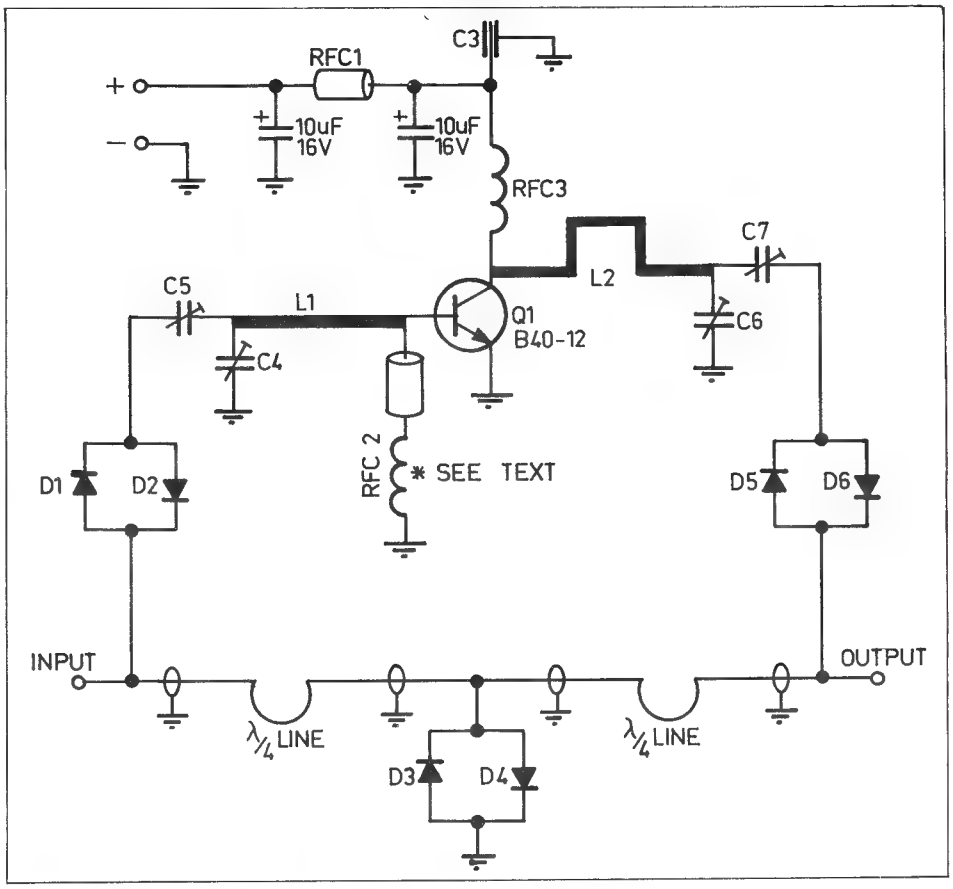

FIG. 1: Modified version of the ETI 710 amplifier employing a B40-12.

6 x BAV10 diodes may be substituted for the 10 x 1N914 or 1N916 diodes specified for the original diode switching circuit.

The 2N6084 is replaced by a CTC B40-12.

C6 is replaced by a 15-115 pf Trimmer (or greater range) such as the ELMENCO A4006/OX.

RFC2 is replaced by a combination choke — a 4 x 1.5 x 9.5/F8 bead is slipped over one lead of a 0.15 to 0.27 uH miniature RFC.

RFC3 is changed to 6 turns, 18 swg tinned or enamelled wire, 5 mm inside diameter, 15 mm long. No resistor in parallel.

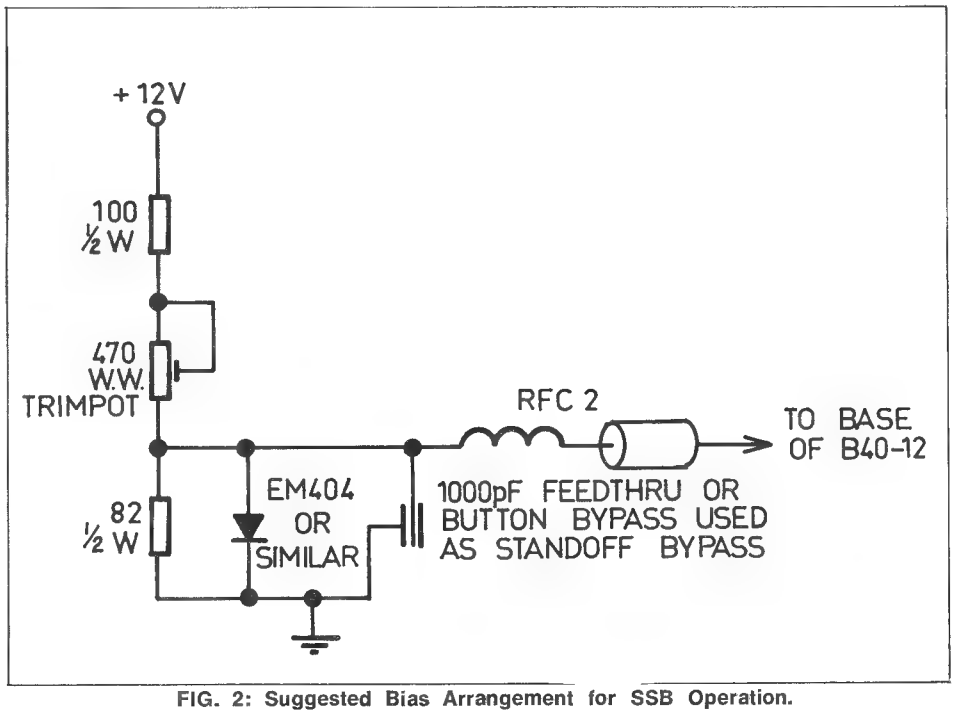

FIG. 2: Suggested Bias Arrangement for SSB Operation.

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PL12/5VA	12 volts at 0.42 amp	6 volts at 0.83 amp
PL15/5VA	15 volts at 0.33 amp	7.5 volts at 0.67 amp
PL18/5VA	18 volts at 0.28 amp	9 volts at 0.56 amp
PL24/5VA	24 volts at 0.21 amp	12 volts at 0.42 amp
PL30/5VA	30 volts at 0.17 amp	15 volts at 0.33 amp

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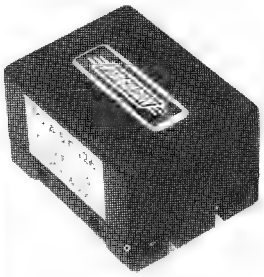

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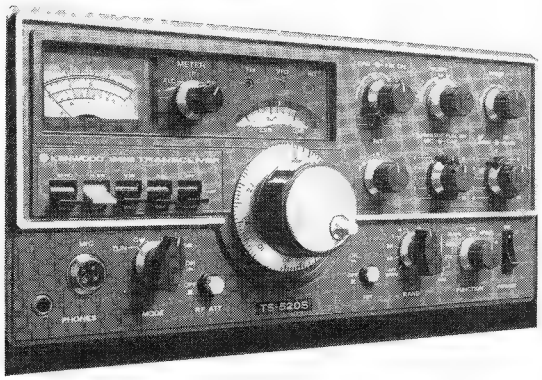

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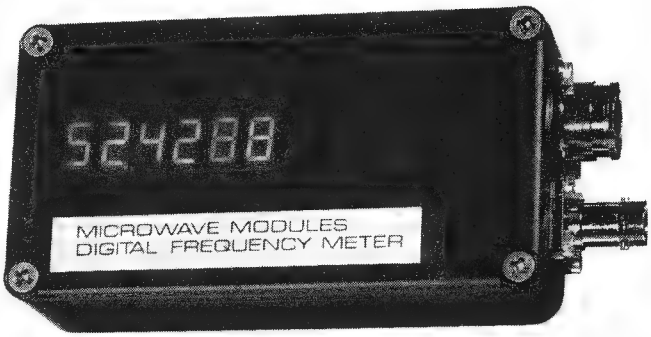

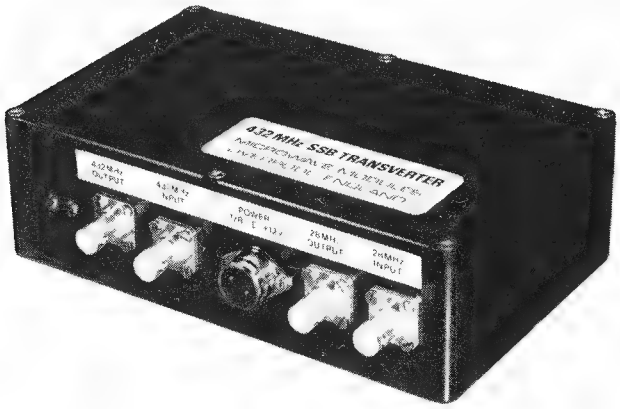

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Input Impedance	200 ohm approximately
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GUIDELINES ON THE TEACHING OF MORSE CODE

Donald E. Pugh VK6DN
(formerly VE3HRA),
c/o Christchurch Grammar School,
Queenslea Drive, Claremont, 6010

The future of amateur radio depends upon the fresh influx of eager novices into the hobby, who are enthusiastic in their support of morse code. The degree of enthusiasm expressed by novices towards the continuous wave means of communication depends upon the quality of instruction to which they have been exposed while mastering the skill. This article suggests a number of scientifically proven steps for the teaching of skills, and applies them to the learning of CW.

1. For the systematic development of skills, it is necessary to identify not only the specific skills to be taught, but also the activities which nurture them. Morse code should not be taught in an isolated context, separated from the rest of amateur radio. It must be seen as an essential and integral part of Amateur Radio. Amateurs with the best of equipment still find morse useful today for communicating with foreign amateurs who are unable to speak English well, but who can write and send simple English. Furthermore, for amateurs with less effective antenna systems, CW makes possible readable DX contacts which are impossible by phone. CW for the beginner should be seen as a unique, exciting means of communication with distant amateurs who are inaccessible in any other way. Consequently, it is important that code practice take place as often as possible over the air, to offer the excitement, immediacy, realism, and meaning that goes with CW communications. Rather than listening to tapes, all learners should be encouraged to listen to DX CW contacts, as soon as possible.

2. An emphasis on the teaching of skills implies an emphasis on student-centred activity as opposed to teacher-centred explanation. The role of the amateur teacher is the structuring and timing of student practice and the actual transmission of morse code. Only through regular listening to CW will the novice learn the skill.

3. Skills should be developed in connection with on-going activities and not in isolation. The actual content of morse transmissions should always be aimed at improving the student's competence in passing the theoretical part of the amateur examination. Use of Q-codes, and simplified technical explanations of components and circuits over the air, provides suitable content for morse transmissions.

4. Activities designed to promote the development of skills should be meaningful to the learner. It is important that the material being sent should be aimed at the level of the learner and be relevant to the amateur program.

5. Development of different skills should go on simultaneously. Students should be becoming familiar with the operation and characteristic sounds of SSB transceivers, by using such equipment as their instrument for learning morse code. In this way, students not only learn the code, but also gain additional skill in distinguishing CW through QRM, QRN, and QSB. They become familiar with the sound of different transmitting "fists" Q-codes, amateur radio topics and talk, and with amateur and transmission characteristics of different parts of the world.

6. The development of skills calls for individualised forms of instruction. Combining students of different level abilities in morse classes is harmful. It is important that the morse being received by the beginner be within or near his capacity to understand. Code that is too slow is tedious, and CW that is too fast is frustrating.

7. Before instruction can begin, each student's standing in relation to the hierarchy of tasks involved in performing a particular skill has to be determined. The type of morse being sent to the student must be suitable for his actual knowledge of the skill. This is particularly true for beginning students who have not yet mastered all the letters and numerals. The students' abilities may easily be determined by a pretest.

8. Provision of practice and feedback tailored to the individual performance of students is essential. The learning of morse involves regular practice, preferably fifteen minutes a day, rather than longer periods at less frequent intervals. Short but regular practice times have been shown to increase learning speeds and enjoyment.

Students must always be provided with some knowledge of how they did following the lesson, and regardless of their results, should be enthusiastically and consistently encouraged and praised. Such positive reinforcement is essential for avoiding student frustration, anxiety, and despair. It is a useful technique to keep a record of the learner's progress, either in the form of tapes of code speeds sent in the past, graphs of success rates, or simply a notebook of material copies each day. In this way the beginner may feel satisfaction and encouragement from a regular review of his performance. Direction is provided to the exercise. It is amazing, beneficial and encouraging for the student to discover how fast he is progressing, and how slow that morse seems on a tape of a month past.

9. In teaching a new skill, the learner should first be made aware of the terminal objective. He should be aware of all the advantages and enjoyment accruing to participants of the Amateur hobby, and with a syllabus of the examination requirements which he faces. Only if the student is converted to the thrill of DX seeking, and the enjoyment of "chewing the rag", will he be motivated to undertake the work required for the licence.

10. In teaching a new skill, the learner should be provided with a model of what constitutes adequate performance of the skill. Here, a tape with accurately timed morse at five and ten words per minute is useful for the beginner to gauge his progress towards his goal.

11. In teaching of a new skill, the learner should be encouraged to attain the highest level of performance that his/her potential will permit. Successful students, upon passing their full ticket, should be encouraged to continue to build their speed. The extent to which former students actually continue to use morse provides a substantial benchmark for the measurement of the teacher's success in inducing enthusiasm for the skill.

12. In the teaching of a new skill, the learner should be provided with positive feedback telling the learner what he/she should do as well as negative feedback telling the learner what he/she should not do. Rather than criticize a beginner for mistakes, such as erratic sending, teachers should simply and quietly demonstrate the correct techniques.

13. Opportunities should constantly be sought for further practice of previously-learned skills. In slow morse transmissions, it is a poor idea to switch to phone in order to explain what has been sent. Reference to the source of the information sent should also be provided in morse, and the total operation be completed in morse. Not only is further practice provided, but more importantly, the emphasis is upon morse as a practical communications mode, not supplementary, but equal to and self-sufficient from phone.

14. In teaching a new skill, allowances should be made for a wide range of performance of the skill. Not all students will emerge as good CW operators. This must be recognized and tolerated.

15. In the teaching of a new skill, the level of difficulty should be increased as mastery is achieved. It is useful to keep morse difficulty always slightly beyond the ability of the receiver. Morse that is being copied at one hundred per cent is slightly slow for practice purposes.

16. In teaching a new skill, the learner should be introduced to its component subskills one step at a time and in a sequence representing levels of difficulty. The ARRL publishes a useful handbook on the learning of morse code, and undertakes a task analysis of the alphabet by grouping letters and words of various diffi-

culties. This hierarchy of the alphabet in terms of difficulty is an invaluable aid in initially learning CW and the handbook is suggested as a necessary teaching aid.

These suggestions concerning the learning of morse have been successfully shown to be valuable in learning all skills. They offer useful guidelines for amateurs embarked upon the rewarding experience of sharing their expertise with others. The implementation of these guidelines promises to ensure the successful arrival of enthusiastic novices who support and enjoy CW as a viable and relaxing communications mode. ■

"VK" — "CB" WEEKEND SEMINAR

Sam Voron VK2BVS.

The first seminar between CB and Amateur radio operators was held on the Queen's Birthday long week-end of the 11th, 12th and 13th June at Hillend. The seminar, entitled "An introduction to the hobby of radio transmitting", was organised by the 4-Wheel Drive Radio Club of N.S.W. (4WD). The seminar was especially designed to firstly provide a whole range of information to those living in the country areas, secondly to bring amateurs and CB operators together in such a co-operative project, and thirdly to provide the basis for development of friendship between CB-er and Amateur, city and country. At seminar, members of the Orange CB Club and the Bathurst CB Club joined with Sydney CB-ers and radio amateurs in discussions ranging from radio procedure, regulations, operating and maintaining equipment and aerials, as well as operating on the 160, 80, 40, 20, 15, 11, 10 and 2 metre amateur bands under the instruction of Sam VK2BVS.

All the aims of this project were realised and the 4WD Club has decided to organise more regular similar seminars between CB-ers and Amateurs.

At the June seminar David Wilson VK2ZCA, from the Youth Radio Educational Service, gave an outline of the new 15 lesson novice hobby transmitting licence course which has since been undertaken at several CB clubs in N.S.W.

The seminar was in the form of a field camping trip with portable generators providing power. Some 50 people attended, ranging from 12 to 70. The BX (Bathurst) CB Club helped enormously, thanks to the organisation of their President.

Members of the Orange and Bathurst CB Clubs learning the art of home-making helical antennas.

RADIO EMERGENCY NETWORK

On Saturday evening, following the crash of a Suzuki bike between Sofala and Hillend, a link between the crash site and Hillend was set up on 11 metres by CB-ers, who passed information on to amateurs who operated a 2 metre link into Orange. The amateur at Orange contacted the Bathurst Hospital where preparations were in progress to receive the accident victim. ■

A Dx-er's BOAST
I've Worked Everywhere"

Alan Shawsmith VK4SS.

(Short Parody of Lucky Starr's "Ive been everywhere" — to be read rapidly.)

I've worked 'em everywhere —
Kamaran, Sudan, Vatican, Cayman,
Afghanistan, Pakistan, Yucatan, Isle of Man,
Beat that if you can.
Libya, Sardinia, Zambia, Nigeria,
Bolivia, Colombia, Liberia, Siberia
— and other places rare and eerier.
Aland, Iceland, Greenland, Finland,
Poland, Thailand, Holland, N'foundland.
Yeah, I swing the beam around.
Highville, Brazzaville, Amityville, Townsville,
Hicksville, Libreville, Abbaville, Hamsville
— and ever other ville and hill.
Sicily, Niamey, Hungary, Enderbury,
Italy, Orkney, Calgary, Canterbury.
Yes sir, I've been busy — very.
Trenton, Gordon, Nelson, Boston,
Canton, Brandon, Saigon, Houston.
Never miss, I'm spot on.
Pusan, Japan, Iran, Bhutan,
Surinam, Jordan, Azerbaijan.
Yep, I've wkd 'em all man.
Shangai, Brunei, Hawaii, Haiti,
Burundi, Alofi, Hanoi, Tbilisi.
Nothing's passed ME by.
Pagoda, Samoa, Eindover, Balboa,
Bogota, Angola, Andorra, Lisboa.
Oh yes and throw in Goa.
From the oldies to the new,
From Samarkand to Timbuctoo.
I've worked 'em all, it's true.
Hullo, who's that calling me?
This is Sikkim calling — AC3.
Boy, I sure want an AC3.
But you've wkd everywhere man.
So you can't need me, 73. ■

QSP

COMPONENTS

The Victorian Division Council has decided to terminate component trading as of 31st December, 1977, and members are therefore recommended to send their orders in now as many lines will not be replaced when stocks run out. No more credit notes will be issued. Holders of credit notes are requested to order components to the value of their credit.

UK REPEATERS

"We just cannot understand why the small group which gets its kicks from deliberately interfering with repeaters, cannot leave them alone and find some constructive thing to do. Surely the HF/UHF bands are wide enough to permit all types of operation". From Mobile News June '77.

WANTED KNOWN

If you have held an amateur licence for 25 years or more you are eligible for membership of the Radio Amateurs Old Timers Club now active in all States. If you would like to become a member contact Harry Cliff VK3HC, Max Hull VK3ZS, Stan Dixon VK3TE, Snow Campbell VK3MR, the founder, Bob Cunningham VK3ML, or any existing member of the Club for details of certificate, etc.

SCOUT NETS

Australian Scout Radio Net first Sunday, each month 7090 kHz 09.30-11.00 h EAST or 14290 kHz 11.00-13.00 h EAST. All frequencies plus or minus QRM. Also South Australian Scout net first and third Thursdays 3590 kHz from about 19.30 h to 20.00 h local SA time.

AMATEURS ON 11 METRES

Amateurs who wish to remain on 11 metres by obtaining a CB licence are invited to join the VK CB Club. The aim of the Club is to assist the citizen in the use of his or her CB station as well as assisting CBers who would like to study for the novice amateur licence. Membership to the VK CB club is open to all amateurs, all those studying for an amateur licence and all those who wish to one day become radio amateurs. The VK CB club will work with all other CB clubs and will reflect a spirit of the amateurs' contribution to the development of the Citizens Radio Service.

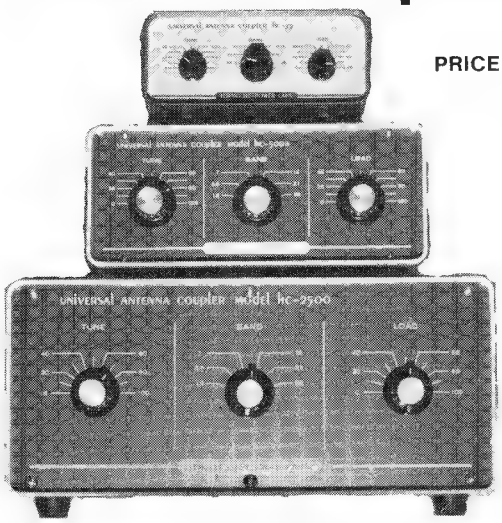
For more information on the VK CB Club write to Sam Voron VK2BVS, 2 Griffith Avenue, East Roseville, 2069; and enclose a self-addressed stamped envelope to assist in a speedy reply. ■

AFTERTHOUGHTS

Our resident gremlin has struck again! Greg Brown's article "A Solid State Video Modulation System", AR July 1977, has an error in Fig. 2 as published. A 6.8 k ohm resistor is shown on the input of the MPS 6514 with one end connected to the + 12 volt coil. This end should connect to the collector of the MPS 6514. The other end remains connected to the 5.6 k ohm resistor, 25 mF and 1000 pF capacitors. ■

TOKYO HY-POWER LABS.

"Hy-Power" Universal Antenna Couplers



PRICE HC-75 $54
HC-500 $112
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The HC series of couplers will match a 10-600 ohm impedance (even higher if load is purely resistive) into 50 and 75 ohms. Multi band operation is possible with a 5 to 20 metre long single wire antenna. Second harmonic attenuation of up to 30 dB can be realized. Receiving advantages include improved cross modulation characteristics due to band pass effect of the coupler, improved signal to noise ratio due to correct front end matching.
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Technical Data

*1.9MHz only 200W PEP

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Bands	3.5, 3.8, 7, 14, 21, 27, 28		1.9, 3.5, 7, 14, 21, 27, 28	
Input Impedance	50 or 75Ω			
Output Impedance	10 ~ 600Ω			
Max. Power	75W PEP	500W PEP	500W PEP*	1.5KW CW 2.5KW PEP
Dimensions	160W 70H mm 200D	240W x 100H x 160D mm		340W 150H mm 255D
Weight	1.5 kg	3 kg		8.5 kg

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3.16	¾	16	3	No. 3011	$1.40
4.08	1	8	3	No. 3014	$1.56
4.16	1	16	3	No. 3015	$1.56
5.08	1¼	8	4	No. 3018	$1.75
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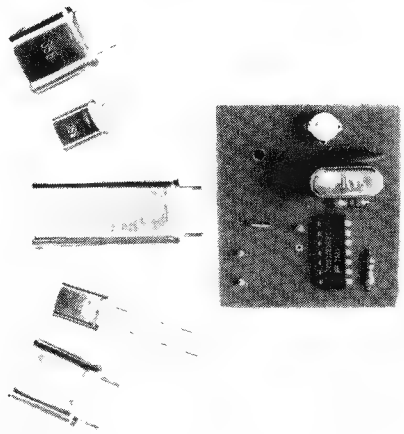

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RECOGNITION FOR JA OPERATOR

Des Greenham VK3CO,
23 Stewart Street, Seymour, 3660

Some time ago in AR, reference was made to a rather special amateur station in Japan.

This is JH6THP, operator Chitary, who is incapacitated and operates his station from his bed in the National Hospital at Kawatana, near Nagasaki in Southern Japan. Chitary, who is very active and very well known by VK stations on the 15 m band, speaks excellent English learned by himself from books — no mean achievement. He currently teaches school students English language in his spare time.

Chitary, during recent years of operating on 15 metre band, has made numerous firm friends in many countries, including Australia, New Zealand, U.S.A., Canada, Philippines, Papua New Guinea, etc.

Recently he initiated a scheme to form "Pacific Amateur Radio Society" (PARS), to include amateur radio stations in countries bordering the Pacific Ocean. The Society has Chitary as its inaugral President and is currently registering members. Numerous stations have joined to date and the Society is now functioning. Shortly, the first PARS publication will be released to members by mail. A "net" is operated on 15 metres and members "check in" regularly when conditions permit.

Recently a letter was received by Citary from the Australian Ambassador to Japan acknowledging his work in Amateur Radio towards the development of friendly relation between Australia and Japan (see letter).

This letter is a great source of pride to Chitary and is of immense value to him — particularly as he is confined to bed and cannot engage in normal activity. It is gratifying to realise that governments are able to see, and recognise, people who are devoting time and effort towards better understanding between nations — surely something desperately needed in today's troubled world.

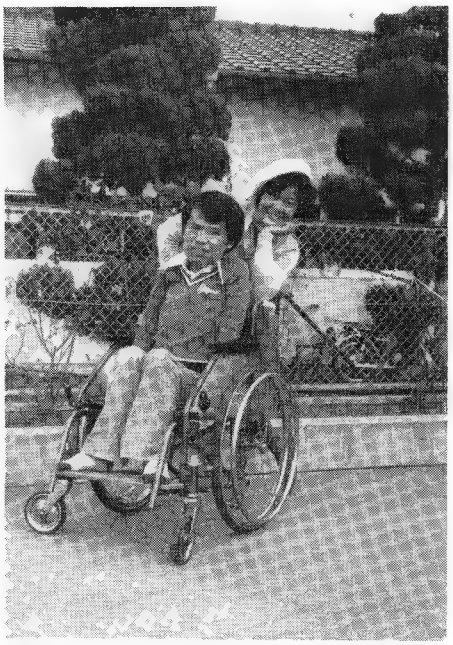
Parliament House,
Canberra, A.C.T. 2600

Minister for Post and Telecommunications,
and
Minister assisting the Treasurer

Mr. Chitary Moriyama,
Room 11, DMP Ward,
Kawatana National Hospital,
2005-1 Ohaza Shimogumigou,
Kawatana-cho Higashi Sonogi-gun,
Nagasaki 859-36.

Dear Mr. Moriyama,

The Australian Ambassador to Japan, His Excellency, Mr. K. C. O. Shann, C.B.E., has recently written to me regarding your achievements in the field of amateur radio.



Chitary — JH6THP

As the responsibilities of my Ministry include the administration of the radio frequency spectrum in Australia I have a particular interest in radio activities. I was particularly impressed to hear from Mr. Shann of the activities of the amateur radio club, that you and some of your fellow patients have formed at the Kawatana National Hospital, Nagasaki. I understand that you are the President of the Club and that in addition to this, you have also established your own amateur station in your room at the Hospital.

I would like to take this opportunity of commending you on all you have achieved, particularly when these achievements have been made in the face of such a severe personal handicap.

As you are aware, amateur radio is a wonderful medium. I cannot, however, think of the radio art being used in a more beneficial manner than the way in which you and your friends are employing it. The establishment of contacts with people in other parts of the world fosters international goodwill and friendship and I believe that through your efforts, you are contributing in no small way to a greater understanding between the various peoples of the world.

Once again please allow me to convey to you on behalf of both myself, and my Department, warmest congratulations on all you have achieved and best wishes for your future attainments in amateur radio.

Yours sincerely,
(Signed) ERIC L. ROBINSON. ■

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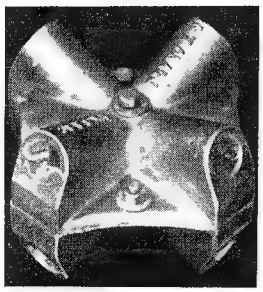
VK3ASC



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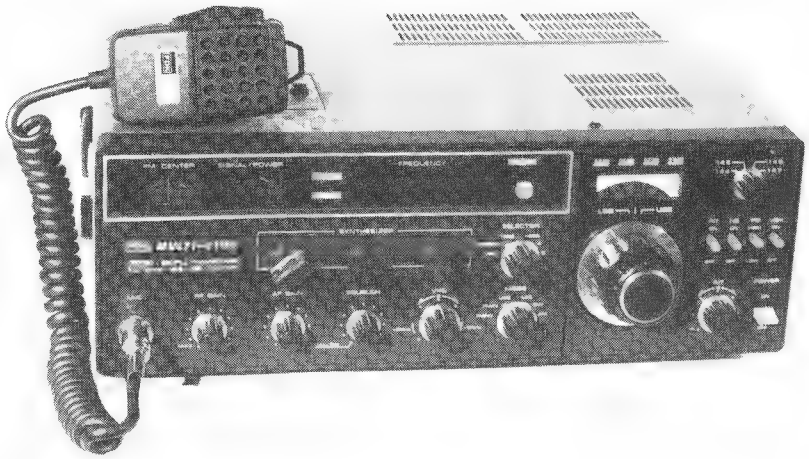
AN AR SPECIAL:

REVIEW OF THE MULTI 2700 TRANSCEIVER

New equipment for the two metre amateur seems to be never ending. Further, it appears that technical innovations are appearing more often with this section of amateur gear than perhaps for all other types. The subject of this review is the Multi-2700 transceiver. In a nutshell we have a rig with 144 to 148 MHz coverage on FM, SSB, CW, and AM. Two different methods are provided to cover this range, firstly with a switch selected synthesizer in ten kilohertz steps with a VXO to allow operation between these points. Then secondly a normal VFO with continuous coverage of the range in four, one megahertz, steps. All the usual facilities such as noise blanker, VOX, repeater offset, speech compression, S meter and centre zero discriminator meter are there. But there is even more. Included in the package is a ten metre converter to allow operation through OSCAR. It is hard at this time to think up any addition that needs inclusion.



The FDK Multi 2700 Photo: Reg Goudg

However, back to the beginning. The Multi-2700, which is a product of the Fukuyama Co. of Tokyo, is imported into Australia by Sideband Electronics Imports of Springwood, N.S.W. For the present time these rigs will only be available on order, and it is not anticipated that they will be a stock item. For this reason our review will not be quite as lengthy as usual. We will, however, present a description and performance summary which will enable any interested amateur to decide whether this rig is for him or not.

The Fukuyama Co. is of course well known in Australia with its "MULTI" products and the MULTI 7 was the subject of a review in this magazine some time ago. The MULTI 2700 is actually an adaptation of the MULTI 2000, which was possibly the very first of the multi-mode two metre transceivers available on the Australian market. For those readers interested a review of this transceiver appeared in CQ magazine for January 1976. For some reason the Multi 2000 was not a great success on the Australian market, perhaps because of the lack of a normal continuous tuning arrangement. It seems that this might have been the reason for the Fukuyama Co. to add this to the 2000, making the 2700. However, as well as the VFO, other changes have been incorporated to set this rig apart from most of the other multi-mode transceivers on the market. The synthesized section now has a full LED digital readout, while the VFO section has a very smooth and clearly illuminated dial. The one megahertz steps are indicated by illuminated signs above the VFO dial scale.

In use it was found to be a very convenient system. The synthesized section with the digital readout could be set up on the FM portion of the band and easily switched from one channel to another while the VFO could be set up for SSB operation. There is no doubt that this overcomes one of the problems with the fully tuneable two metre transceivers, that is, accurately setting up the dial for each of the required FM channels. The built-in speech compressor is most effective and with weak signals makes the difference between the signal being readable or not. In appearance the MULTI-2700 is unusual. It has a somewhat wide, low look, with the VFO section looking rather tacked on. The dimensions are 128 mm high, 378 mm wide, and 305 mm deep, and the weight is 14 kg. The transceiver is entirely self-contained with built-in AC power supply and loud speaker. Operation from twelve volts DC is also provided by changing the power cord. In appearance the 2700 has a somewhat "plastic" look. Whilst no doubt attractive overall, it would be very much a matter of opinion whether you would consider it professional. The meters and dial scale are illuminated in vivid green, the LED readout in red, and with red and green indicator light.

THE MULTI 2700 ON TEST

We submitted the 2700 to our normal series of tests. In general it exceeded the published specifications by quite a wide margin.

Power output was first checked with the rig in the high power position.

144 MHz 16 watts; 145 MHz 18 watts; 146 MHz 18 watts; 147 MHz 16 watts; 147.99 MHz 14 watts.

The power output at 148 MHz exactly had dropped to 6 watts. These figures greatly exceed the published output of ten watts.

On SSB, the PEP output was 144 MHz 14 watts; 145 MHz 16 watts; 146 MHz 16.5 watts; 147 MHz 16 watts; 147.9 MHz 14 watts.

Transmitted audio quality was judged to be well balanced and clean on SSB but somewhat bassy on FM.

The receiver section was next tested. Three degrees of selectivity are provided. The mode switch allows either wide or narrow FM reception, while on SSB, AM and CW a common 2.4 kHz bandwidth is provided. The FM bandwidth was checked at a receiver input of .5 mV. The narrow position would handle 5 kHz deviation with low distortion and the wide, 7 kHz. Increasing either of these by only one kilohertz produced noticeable distortion. With stronger signal input the receiver would handle somewhat higher amounts of deviation, but it proved beyond doubt that deviation must be kept down for weak signal reception.

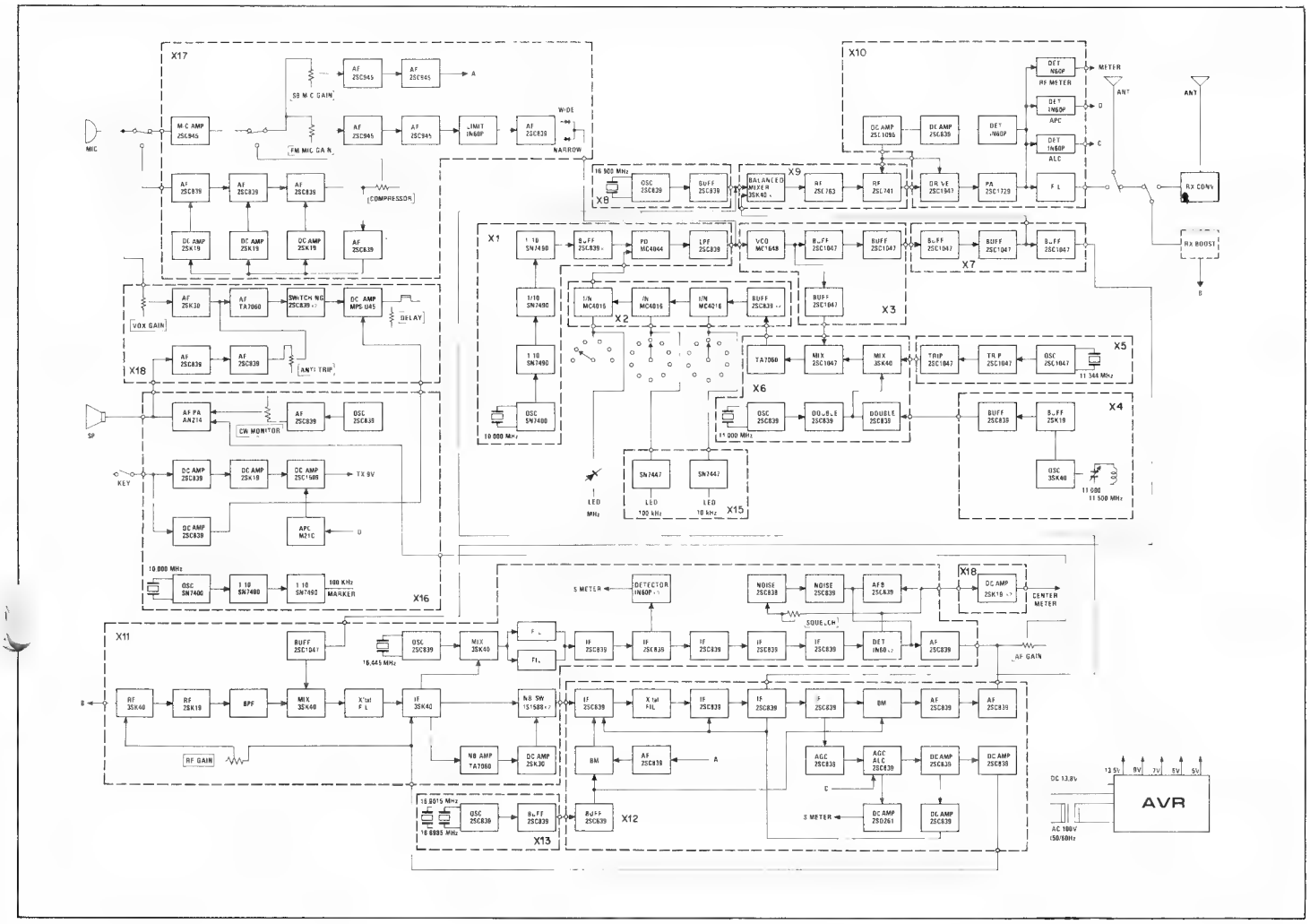
Next the receiver was check for sensitivity.

FM reception. The mute opened .2 uV.

At .5 uV 18 dB quieting was produced an at 1.0 uV the figure was 24 dB. On SSB, the signal to noise ratio was 15 dB at .2 uV and 23 dB at .5 uV. The calibration of the "S" meter was checked.

"S" Reading	SSB	FM
1	.35 uV	.7 uV
2	.4 uV	.9 uV
3	.5 uV	1.7 uV
5	.55 uV	2.1 uV
7	.7 uV	2.5 uV
9	1.9 uV	3.5 uV
9 + 20	5.0 uV	8.0 uV
9 + 40	45.0 uV	30.0 uV

From this it can be seen that S meter readings are somewhat generous but as it is normal to work with very weak signals on VHF they are probably useful in relation to the average signal encountered. The accuracy of the synthesizer was checked and it was found to be 400 Hz high. The 600 kHz offset was within 100



BLOCK DIAGRAM

Hz in relation to the above error. The transmitter deviation on FM was checked and found to be 4 kHz in the narrow position and 9 kHz in the wide. It should be noted that the speech compressor only works on SSB

The ten metre OSCAR converter was checked for sensitvity and found to be [illegible] uV for 9 dB signal-to-noise ratio and 1 uV for 15 dB.

The VFO dial calibration and linearity were excellent. Over the full one megahertz calibration was within ± 1 kHz. Stability was likewise good with less than 1 kHz shift over a one hour period from initial switch on.

The MULTI 2700 proved to be a delight to operate. With the synthesizer set up on a favourite FM channel, it was possible to go from FM to SSB with a click of the mode and selector switch. A very handy facility. It is, of course, possible to reverse the functions and operate SSB with the synthesizer and FM with the VFO, but there is no repeater offset facility with the VFO. Only simplex operation is possible.

Unfortunately we were unable to check the OSCAR capabilities of the 2700 while on test as a suitable antenna was not available.

The VFO tuning dial had a two speed drive which proved to be exceptionally smooth to operate. A receiver offset control is provided.

The instruction book is well written and comprehensive but, as is usual these days, makes little mention of servicing. The trouble shooting page covers mostly operational errors. However, a large and clear schematic diagram is included.

As mentioned earlier, these sets are not available ex stock at the present time. Information on price and delivery can be obtained from the importer, Sideband Electronics Imports, P.O. Box 23, Springwood, N.S.W., from whom the review sample was obtained. ■

C.A.R.E. (COMMUNITY AMATEUR RADIO EVENTS)

ALERT AMATEURS HELP APPREHEND CAR THIEVES

Early on Sunday morning (around 4.00 a.m.), 24-7-77, Jim VK3ZOS, who was mobile in Springvale Road, Keysborough, sighted a vehicle parked on the median strip with a broken side window. As he slowed for closer examination, the vehicle was driven off at high speed. It was apparent that the car was stolen.

Jim was able to follow the stolen car and relay details through the Ch. 2 repeater, VK3RML, to Garry VK3ZSP, who contacted the Melbourne police by phone.

By keeping the phone line open, Jim and Garry were able to relay messages to the police radio room (D24), who in turn directed patrol cars to the area.

A merry chase lasting 15 minutes eventuated.

The efforts of Jim and Garry enabled the police to apprehend the offenders without violence or injury.

Just another small anecdote showing the virtues of amateur radio giving assistance to the community.

(Contributions to this column are solicited.—Ed.) ■

WIA CORRESPONDENCE

8th August, 1977.

Secretary,
Postal & Telecommunications Dept.,
G.P.O. Box 5412 CC,
MELBOURNE, 3001.

Dear Sir,
This Institute, representing the amateur service in Australia, wishes to express concern about a wide range of largely inter-related developments affecting the service.

Of first importance are those matters which stem from the staff shortages within the Regulatory and Licensing Branch as exemplified in paragraphs 53 to 58 of the Report on the Introduction of a Citizen Band Radio Service to Australia and further illustrated by the low priority accorded to amateur service affairs.

The Institute observes that somewhat similar situations have manifested themselves in the United States of America and the United Kingdom. In these countries certain measures have been taken, in acceptance of the fact that the amateur service is largely self-regulating, to abolish a number of restrictions which created an unnecessary loading on the licensing and regulatory workforce.

In various submissions to Government in recent times the Institute has emphasised that the work being done by Departmental officers is of a high standard but, in the light of re-organisations and reduced numerical strength, further assistance is vitally necessary —

(a) To streamline and to reduce to a minimum the various procedures and systems presently in force;

(b) To investigate every possible avenue of assistance in carrying out certain specified duties; and

(c) To strengthen, as quickly as possible, the processes of law and order relating to frequency spectrum usage.

Having regard to the manner in which CB legislation was engineered, a not unsubstantial number of radio amateurs not only anticipate the permanent loss of the 11 m band to the amateur service in Australia, but are most apprehensive about the eventual fate of certain other amateur service bands. The Institute, however, does not necessarily subscribe to these views since it must believe that the Government will adhere to the present intentions and will take such steps as are necessary to contain the situation within existing parameters.

Unfortunately, the lack of urgently required measures to control the sale and/or importation of transceivers designed for use in this part of the spectrum, coupled with almost non-existent spectrum management police action against illegal operators, lends support to those who lack confidence in the bona fide intentions of the Government in this technical field.

This Institute trusts that wiser councils will prevail and therefore asks for reassurance that appropriate measures are to be taken before it is too late. It is not possible to believe that the Government willingly desires to place in jeopardy the credibility of Australia in international radio communications circles built up over so many years. Furthermore, the Minister ought to be reminded at every opportunity of the chaotic conditions surrounding illegal operations in the U.S.A. and how these cannot fail to be taken into account unfavourably at the WARC 79 deliberations.

As will be observed, this Institute wishes to place on record in the strongest possible terms condemnation of illegal operators of transmitting equipment. This has been made clear on numerous occasions in the past. The Institute recommends that the detection and conviction of illegal operators is of paramount importance. Measures to strengthen the forces of law and order must be taken and at the same time every effort ought to be made in every other direction to reduce the work load to achieve this objective.

Consequently, this Institute wishes to propose a number of changes relating to amateur radio licensing and procedures. These are detailed in Appendix A to this memorandum.

The Institute has for some time been disturbed about the low priority accorded to amateur radio affairs in the Department. However, when this low priority rating becomes more evident as exemplified by the very lengthy waiting time experienced by successful examination candidates obtaining their amateur licences, it is of no comfort to the applicants (a) that CB licences can be obtained almost "over the counter" and (b) that the normal delay time for amateur licences was three weeks. The waiting time is now of the order of six months in some States and lengthening.

Some improvements in the examinations area have been welcomed, namely: multi-choice questions and answers (although others, not of an essay type, should not be ignored), quick marking of these kind of papers and announcement of results within a reasonable time. Nevertheless, it is believed that some scope for further improvements exist. Firstly, it is recommended that candidates sitting for amateur examinations should be presumed to apply for an appropriate licence if they pass. If this fact is recognised and accepted it is suggested that an integrated series of forms should be completed by the candidate at the time of the examination so as to reduce the amount of clerical work involved in —

(a) Advising pass/failure,

(b) Issuing a certificate (where appropriate),

(c) Issuing an appropriate licence.

Secondly, the Institute wishes to assist with some or all of the examinations if an independent Education Authority cannot be found to take these over from the Department (cf. City and Guilds Institute for the U.K.). The problems which arise may be listed as —

(a) Infrequency of exams (twice yearly for each),

(b) Inability to examine candidates in many centres of some importance (Launceston, Warrnambool, Kalgoorlie, etc.), necessitating considerable travel and time off for those country area candidates, many of whom can ill-afford either or both.

(c) Some overcrowding in the main centres.

A set of proposals is attached hereto as Appendix B. It should perhaps be pointed out that, so far, there should be little, if any, repercussions internationally in relation to Novice Licensing since no reciprocal licensing arrangements appear to have been announced for this class of licensee. It is accepted that the standards and methods of conducting examinations should receive some recognition for reciprocity of licensing. Nevertheless, the number of amateurs requiring reciprocal licences during the validity of their licence is comparatively small. It should also be pointed out that amateur licence examinations in several countries overseas are conducted by the amateur radio society itself (e.g., Indonesia) or some other body. The fact that no international opposition appears to have been voiced reinforces the Institute's submission that Radio Regulation 1564 is capable of liberal interpretation. It is not necessary therefore to follow British practices and traditions to the letter.

Yours faithfully,

P. B. DODD,
Secretary.

APPENDIX A

This is divided into two parts. Part A relates to matters still before the Department, having been submitted in correspondence dating back to 1976 and earlier. Part B relates to other matters.

PART A

(1) **Third Party Traffic** of a restricted kind, namely:

(a) A revision of paragraph 94 of the Handbook to permit emergency traffic to be handled as an automatic dispensation by amateur radio WICEN stations called in or being used . . . communications concerning an emergency or involved in properly constituted practice nets.

(b) A revision of paragraph 80(a) of the Handbook to cater for common practices in the amateur service such as passing net traffic lists to establish proper net control.

(c) The items (a) and (b) might fall away if third party traffic is granted to the amateur service as proposed in letter dated 27/6/1977.

(d) Official broadcasts by the WIA should be permitted at any time and on any frequencies.

(2) **Beacons** (attended and unattended) should be licensed for operation in any part of any amateur band subject to compliance with WIA frequency plans.

(3) **Use of telegraphy by limited licensees** should be permitted.

(4) **Station identification** period should be extended to 10 minutes instead of the present 5 minutes (U.S.A. allows 10 minutes, U.K. allows 15 minutes).

(5) Amateur stations should be granted no less assistance in relation to **interference** problems than is afforded to other services and in particular —

(e) should expect collaboration in obtaining more stringent measures to be taken by manufacturers to reduce the susceptibility of commercial equipment to radio frequency emissions;

(b) should expect that commercial broadcasting stations be moved to parts of the spectrum where their operations are likely to cause less interference to stations in other services and vice versa (TV Channels 0 and 5A are the serious offenders in this respect);

(c) should expect that suitable standards be adopted and policed to reduce interference caused by electrical appliances and equipment of all kinds; and

(d) should expect that radio alarms and other non-specified radio devices should not operate within amateur bands.

(6) **Reduction in licence fees for pensioners and disabled persons:** Promised in letter RB4/4/32 of 19/10/76 but not yet implemented.

(7) **Identification by RTTY stations** — revision of paragraph 112 promised in telex RB4/11/35 of 8/12/76.

(8) **Repeater conditions.** Various matters still require liberalisation, namely:

(a) Since the WIA has published band plans for repeaters in order to avoid chaos, it has previously been submitted that no repeater licence should be issued by the Department unless prior agreement is given by the WIA in relation to the frequency it is proposed to authorise.

The insistence that repeaters should be provided with manual on-site shut down switches cannot be met whilst the Department still requires that proper security measures must be provided for the installation as a whole. There are other methods, acceptable to the amateur service, of closing down repeaters when so required by the Department which necessitate very little time and effort on the part of regulatory staff.

(c) The number of amateur service repeaters should not concern the Department as this is a matter for the service itself to resolve.

(d) Repeaters should be permitted on all amateur bands from 144 MHz upwards; if, however, frequencies are selected on shared bands which could cause interference to the primary service the WIA should be advised (if need be on a confidential basis) accordingly and given options of other channels which are clear.

(e) Various other conditions should be liberalised as requested — letter of 30/7/1976 refers.

(9) The Institute is disturbed to observe that in some States **Amateur Advisory Committees** are inoperative. These are considered to be a valuable service and the alleged lack of funds to pay overtime for the official staff should be reversed. In addition a review of the work of these Committees has been under discussion with the Department for several years but nothing has been initiated to this end.

(10) Applications have been made over a long period of time for **additional frequencies.** The Institute agrees that these might usefully be discussed in the context of WARC 79.

(11) It has been suggested that the **period of validity** of amateur licences should be extended from one year to three years to economise on renewals. Paragraph 28 of the Handbook refers.

(12) **Examination matters** appear in Appendix B.

PART B

(1) **Third Party Traffic.** Relaxations similar to those in force in the U.S.A. have been requested in a letter dated 27/6/1977.

(2) **Portable and mobile operations.** Paragraphs 90 to 93 of the Handbook impose additional work on the Department without, it is submitted, conferring any positive benefits providing the Department insists upon all amateurs advising changes of addresses. The days when mobile operations were comparatively rare events have long gone — many amateurs today operate mobile from their vehicle as a matter of daily routine. Paragraph 92 could be retained. In the light of these proposals paragraphs 87 to 89 and 39 should be revised and liberalised very considerably.

(3) The mandatory requirement to keep a **log book** — paragraphs 85 and 86 in the Handbook — should be modified to become a voluntary requirement.

(4) Paragraph 84 of the Handbook should be modified in relation to radio amateurs to exclude communications transmitted or received directly concerning amateur service matters. In this context it is pointed out that a radio amateur contravenes the secrecy provisions if he reports on pirates or intruders.

(5) It is submitted that a common meeting frequency-segment should be authorised where all classes of amateur licensees may communicate one with another. The Institute would wish to make further submissions in this regard at a future date.

(6) The requirement that amateurs should obtain permits to conduct television experiments should be abolished.

(7) **Novice licensees should be permitted** to use variable frequency transmitters.

(8) Any amateur, upon application, should be granted "Citizens band" licences free of charge.

APPENDIX B

1. Detailed examination syllabuses are considered to be essential. A Novice theory examination syllabus has been submitted by the WIA to the Department but not yet approved.

2. Four examinations of each class should be held every year.

3. More examination centres should be provided.

4. The adoption of "multi-choice" and similar techniques should be universally adopted for theory and regulations examinations. The pass mark should be reduced from 70 per cent to 55 per cent. Any candidate obtaining more than 50 per cent but less than 55 per cent marks in the theory paper should automatically qualify as having passed the Novice theory examination.

5. The identification of examination candidates should include the provision of a signed passport-type photograph returnable on request if a failure results.

6. The results of examinations and the availability of licences should not be delayed beyond three (or at the most, four) weeks after the date of the examination.

7. Lists of successful candidates (or copies of licences issued) should be made available to the WIA within one month.

8. General comments by the examiners about the failure rates and possible reasons why they occurred should be issued after each set of examinations.

9. **Morse code examinations** should be given at speeds other than 5 and 10 w.p.m. and endorsement or "stickers" be made available to successful candidates on application.

10. The spacing lengths between letters should be modified from strict compliance with the ITU standard; submissions on this aspect have already been made but no results are known.

11. The Institute believes, and has stated, that its assistance should be sought on —

(a) Invigilation of some or all examinations by responsible licensed amateurs.

(b) Some of the examinations, especially the morse code tests and Novice theory parts, should be conducted by responsible amateurs under controlled conditions which will now be set out hereunder for consideration:

(i) **Morse Code examinations:**

(a) **Novice:** Should be set, taken and recorded by any full call licensed amateur approved for the purpose by the WIA Divisional Council concerned. Exam may be held at any time and place mutually satisfactory to all parties.
Examination general instructions to be provided by the Department.
Result of exam to be recorded on a special form designed to serve all purposes (advice to candidate, report to Department).

(b) **Other:** WIA Division concerned to submit to Department a panel of members recommended to hold these exams; Department to approve names.
Exams at 10, 12 or more w.p.m. may be held at any time and place mutually satisfactory to all parties.
Examination general instructions to be provided by the Department.
Exam to be held in the presence of a witness approved by WIA if considered necessary; tape recording of proceedings if considered essential.
Results to be recorded on a special form as for Novice exams.
Department to hold one morse exam each year for speeds over 10 w.p.m. for any amateur wishing to qualify for the issue of an internationally recognised certificate — if considered necessary.

(**NOTE:** Automobile Associations overseas issue an International Driver's Licence to any member wanting such a document and this is officially recognised internationally — similar principle is therefore known in other spheres.)

(ii) **Theory examination:**

(a) **Novice:** Department to approve a "bank" of multi-choice (and similar mode) questions for the Novice exam in accordance with an agreed syllabus. Questions might usefully be grouped under such section headings as "Interference", "aerials", "receivers", etc.
Answers key to be held by a Divisional Education Officer appointed by each Division who should attend all exams **if possible.**
Divisional Councils to nominate licensed amateurs for purposes of holding exams and names to be submitted to Department for approval.
Exams to be held at any time and place mutually convenient to all parties. Department to issue general instructions about such exams. Time and place of exam to be notified one week in advance to local Divisional Education Officer.
Unless otherwise instructed by the Department 15 questions to be put to candidates including at least one question from each section. Allow two minutes to answer each question.
At conclusion of this part the examiner to ask one general question for candidates to answer from a prearranged set (e.g., simple circuit diagrams, write out a simple formula, draw diagram to illustrate skip, etc.).
Collect and where possible mark the papers there and then and issue special integrated form with copies for all concerned. (If Divisional Education Officer unable to attend he can supply the examiner with an answer sheet key in a sealed envelope to be opened by the examiner in the presence of the candidate/s at the conclusion of the exam and this fact authenticated by signatures on the sealed envelope for return to the Divisional Education Officer.)

(b) **Other:** It is recommended that responsible radio amateur invigilators should be appointed. Nomination of specific persons could be by the Division concernd with names being submitted to the Department. These invigilators would be for country areas at some distance from present examination centres. The proposal is that the Department sends to the invigilator a sealed envelope containing the exam papers. If no candidates attend, the sealed envelope is returned intact in an enclosed stamped envelope supplied by the Department. If candidates attend the invigilator complies with printed instructions, opens envelope in presence of candidates and obtains their signatures certifying this was done in their presence.

(iii) **Regulations examination:**
Same principles as for Theory (b).

NOTE: Theory and Regulations exams — It is recommended that, with the assistance of the WIA, the Department should produce a "bank" of questions to enable examination papers for individual examinations to be prepared quickly at small cost. It is suggested that the general question "bank" should be used to produce 75 per cent of each individual examination paper. The remaining 25 per cent of questions can derive either from a separate "bank" or be prepared on an ad hoc basis for each exam. If this suggestion is followed and if answer overlays are used for answer papers keyed one with the other a very quick rate of marking can be achieved. If an integrated application form is also introduced it is suggested that —

(a) Licensing delays can be minimised, and

(b) At least four examinations of each kind should be within the capabilities of the Department each year. ■

IARU NEWS

Six new members have been accepted into the IARU. These are the amateur radio societies of Sierra Leone, Bahrain, Botswana, Turkey, Papua New Guinea and Jordan. The grand total is now close to the 100 mark. But remember, there are 153 members of the ITU.

The SARL received a letter from their PMG stating that their broadcasting services had requested the deletion of the footnote (No. 212) relating to the allocation of 7100-7150 kHz to the amateur service in South Africa and South-West Africa. This was quoted in Radio ZS for May 1977.

For those who like to keep up to date with developments concerning WARC 79, it is difficult at this stage to indicate how frequency plans for amateur radio will finally crystallise into an integrated whole on a world-wide basis.

In some important countries the possibilities of amateur radio obtaining a reasonable share of the spectrum in each band still shows considerable variations resulting from pressures by other services. These pressures tend to vary from one country to another.

The work of the IARU, quite apart from basics already reported, lies in the detection and evaluation of these variables to achieve a common position world-wide.

Look now at the Australian 80 m band. Much of the world's DX is carried on in a small segment immediately below 3800 kHz. This is in a part of the spectrum not allocated to amateurs in Australia.

As explained in WIANEWS this month, the basic frequency bands to be sought are those which are consistent with IARU. These were adopted as long ago as 1975.

There have been some minor modifications since then, as for example, it would appear more sensible to seek our 500 kHz bandwidth on the 40 m band by going slightly downwards in frequency rather than upwards only. The USA position in this respect was reported in last month's IARU News but obviously did not go down far enough.

Still in the system is a request for a 160 to 200 kHz band. The other HF bands are the same as reported in 1975 but the three proposed new bands remain in the melting pot. On balance it is considered that most of the operators would select something in the 10 to 10.5 MHz area in preference to the other two if ever a selection had to be made.

For VHF and upwards the commitment for world-wide frequency bands follows existing patterns. 50 to 54 MHz, 144-148, 220-225, 420-450 and beyond with small exclusive segments for satellite operations. The higher GHz bands are basically as reported in WIANEWS February 1977.

At the last IWG meeting of IARU it was agreed that the next meeting of the group would be held in Geneva during the Aeronautical Mobile WARC next February, not only to discuss the international position but also to observe the proceedings in such a WARC and meet as many participants as possible. Most of these people also would be delegates to WARC 79.

Incidentally, what is WARC 79? A little background information would assist in an understanding of it.

The frequency spectrum is a limited resource. There is just so much of it, no more.

Very early in the history of radio communications this fact came to be recognised. Without some kind of co-ordiantion and control chaos would soon have developed if every country did as it pleased with frequency allocations in the useful part of it then known, namely, the HF frequencies as we know them today. The radio signals were, and are, no respecters of frontiers.

The International Radiotelegraph Union was formed in 1906. This was merged in 1932 with the International Telegraph Union, formed in 1865, to become the International Telecommunications Union — abbreviated to ITU — formally established in 1934.

The ITU was set up as a technical arm of the United Nations organisation and hence forms a part of it. ITU headquarters is in Geneva and its membership are the sovereign countries of the world desirous of joining it and providing subscriptions to run it. The present membership totals 153.

The ITU's principal officer is the Secretary-General controlling a large office costing around $10 million per annum.

The affairs of the ITU are governed by a Plenipotentiary Conference, Administrative Conferences and, of course, the Secretariat. It controls the International Frequency Registration Board (IFRB) and two main consultative technical committees, one for radio and the other for telegraphs and telephones.

The member countries, which includes Australia, New Zealand, Papua New Guinea and so on, all meet in the regular Plenipotentiary Conferences held at various times for various purposes such as Broadcasting, Maritime, Space and Aeronautical. There is also a main Administrative Conference, known as the World Administrative Radio Conference General, held about once every 20 years. This is the one in which radio amateurs have a main interest. The last WARC General was in 1959 and the next is in 1979, which is abbreviated WARC 79.

The WARC General works to an agenda which up till now included almost everything dealing with radio communications — definitions, frequency allocation tables, radio regulations and general operating codes.

The delegations at a WARC General, from the member countries, will be augmented by observers from many other organisations, including the International Amateur Radio Union (IARU) in addition to ITU Secretariat staff.

Because of the enormous complexities involved, the work of the Conference is broken down into numerous working groups which in turn appoint sub-groups as needed. All the work done and agreed in the various working groups — all of which work simultaneously — goes forward into the Plenary sessions. From the latter derive the agreements which may or may not be ratified by all the member countries. Some may ratify with reservations and numerous footnotes could be advised as varying the agreed frequency tables.

It can be seen therefore that the larger countries of the world must send big delegations so that they will be sure of being able to keep track of the work being done in all the groups.

Such a WARC General as WARC 79, scheduled to last 10 weeks in Geneva, will attract a thousand people or more. Before the Conference a vast range of technical material will be prepared by the consultative technical committees. Amateurs are, of course, interested in the radio committee, which is the CCIR, an abbreviation of its full name in French. The work of the CCIR is carried on all through the years by technical experts appointed by member countries. Australia is represented by the CCIR, and as for WARC's the work is broken up into several specialised committees.

The work done by CCIR assists the work of WARC's, although it would not necessarily take precedence over other matters since it is purely technical. The ultimate decisions could possibly derive partially from political or other considerations. These eventually come out as Radio Regulations operative a year or two later.

There is therefore a very wide gulf between what each country originally prepares as a brief for the Conference and the end results. Each country must prepare such a brief for its WARC 79 delegation, and the WIA, with the help of the IARU, are presently involved in the preparations for the Australian brief. ■

AWARDS COLUMN

Brian Austin, VK5CA

P.O. Box 7A, Crafers SA, 5152

WORKED YUDXC MEMBERS (WYUDXCM)

This award is issued by the Yugoslav DX Club for confirmed contacts with members of the Club.

1. YU applicants need 15 contacts (QSL).
2. EU applicants need 8 contacts (QSL).
3. All other applicants need 4 contacts (QSL).

WYUDXCM is available to licensed amateurs and shortwave listeners. Only contacts after 1st January 1970 are valid.

Please send your application (with details from YU QSL cards), confirmed by two other amateurs and 7 IRCs or US$1 to —

YUDXC,
P.O. Box 82, 62250 PTUJ,
Yugoslavia.

Members of YUDXC (until 1st January 1977):

1. YU2DX	21. YU2HDE
2. YU1BQC	22. YU3DJK
3. YU3EY	23. YU2BOP
4. YU1SJ	24. YU2CAW
5. YU1BCD	25. YU3ZV
6. YU1AG	26. YU4EBL
7. YU2NFJ	27. YU2QZ
8. YU1SF	28. YU1ODO
9. YU4HA	29. YU1ELM
10. YU2AKL	30. YU3TXT
11. YU2OB	31. YU2REO
12. YU2LA	32. YU3TDX
13. YU3CM	33. YU1NSX
14. YU2CBM	34. YU1NPG
15. YU1AHI	35. YU3EP
16. YU2RAZ	36. YU2CBE
17. YU2CQ	37. YU3BU
18. YU3DQ	38. YU3TJA
19. YU2QK	39. YU3TFB
20. YU2BHI	40. YU2RTW

Also contacts with 4N2CI, 4N2SO, 4N2BR, 4N2HV, 4N2KO, 4N2KP, 4N2LO, 4N2MT, 4N0DX and YU8DX are valid for WYUDXCM.

DIPLOMA "JADRAN"

This award is issued by YU2AKL — Radio Klub "Ante Jonic" — Split — Yugoslavia to licensed amateurs and SWL's for confirmation of QSO's with Yugoslav amateur stations located on coast or islands of Adriatic Sea.

YU applicants need 25 QSLs with 8 places.

EU applicants need 10 QSLs with 5 places.

All other applicants need 5 QSLs with 3 places.

Your application with details of QSOs, YU QSL cards and 8 IRCs (or US$1), please send to:—

Radio Klub "Ante Jonic" — YU2AKL,
P.O. Box 89,
58001 Split, Yugoslavia.

Only contacts after 1st January 1970 are valid. ■

LARA

Ladies Amateur Radio Association

This month's item of news comes from the Roving Reporter who attended the LARA Birthday Weekend in VK3. This event was held at a small place called Cherokee and our hostess for the occasion was Heather Mitchell (call sign VK3N?), YF of Peter 3ANX. It was a beautiful drive up there and when we arrived there was a blazing log fire to warm us up. Peter drew a set of superb maps to guide us, and in case anyone got lost there was talk-in on radio.

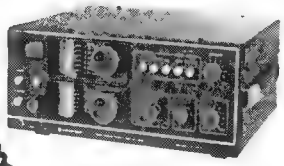
WHAT'S BLACK & WHITE AND TURNS 2-METRE OPERATORS GREEN ?

THE NEW KENWOOD TR-7400

This is the one, the Kenwood TR-7400 FM mobile transceiver of 25/10 watts and complete 2 metre band coverage (144-148 MHz). It has the largest digital readout in its class, and the 800 channel coverage with PLL frequency synthesizer provides you with all existing and proposed Australian repeaters. A convenient front panel switch offsets the transmit frequency up or down 600 kHz.

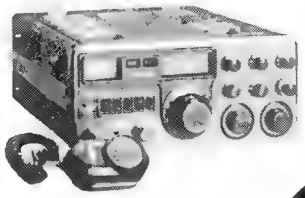
WHENEVER YOU WANT TO MOVE UP — KENWOOD HAS THE WAY

TR-2200 2-metre VHF FM portable receiver



R-300 all band or ham band communications receiver

The new TS-520S HF transceiver — ideal for the novice



TS-700 2-metre VHF all mode transceiver

Your nearest Kenwood dealer will be happy to give you more information on the entire Kenwood range of amateur radio products including the remarkable new TR-7400. Contact him direct or write to us at Weston Electronics.

KENWOOD

Marketed in Australia by
Weston Electronics Company,
2 The Crescent,
Kingsgrove, NSW 2208.
Distributor for Trio Kenwood Corporation, Japan.

PLEASE SUPPLY ME WITH MORE INFORMATION ON

NAME .....

POSTCODE .....

CALL SIGN ..... ADDRESS ..... PHONE No .....

WEC AR 2

A few of the members returned home on the Saturday but a few hardy souls stayed the night then joined in the broadcast call-back on the Sunday. As the week-end coincided with the Mid-winter Field Day, this was also a feature of the program. The traditional barbecue was held on the Saturday evening and as usual "a good time was had by all".

Other Birthday associated activities included a special sked held on Monday, July 25th, on 80 m and a VHF sked held on the Tuesday for Melbourne YL's. These will be reported in the Newsletter by those who took part.

The next edition of the Newsletter will be posted this month, and will include, amongst other things, a voting paper for the LARA emblem, giving members a choice of four possible patterns. Once this is decided, we can print membership cards, notepaper and award certificates, possibly in time for the next AGM.

One of our members unable to join the Birthday Party was Heather Bedson. We understand husband Ray VK3ZEB is ill, and we send best wishes for a speedy recovery to him.

In VK3 there will be a September meeting, held on Saturday 10th, at the home of Marilyn Miezis VK3AOI. For other activities of LARA, members can consult the Newsletter or follow the WIA broadcasts locally for news of activities. ■

ATV NEWS

KEVIN CALLAGHAN VK3ZVJ
PETER COSSINS VK3BFG

This month I have some news of activity in the West. Rod VK6RH, advises me of some activity in Perth. ATV stations over there are VK6PR, VK6PD and VK6RH. The WIA VHF Group also have a large amount of surplus equipment which includes a 2 inch RCA tape machine, Image Orthicon Cameras, vision mixer and sundry other pieces.

The exciters used for transmission are all from VHF Communications (DJ4LB), although Rod has a 2W linear and plans to build a 4CX250B afterburner. They are all operating on the National Simplex Channel of 426.25 MHz (take note VK5!).

Les Jenkins VK3ZBJ, has designed a new converter for ATV. The unit is very small and has the feature of high rejection to VHF Amateur Band and commercial TV transmissions.

It is a broad-band device, which when correctly aligned is suitable for use in any part of the 70 cm band (no troubles in receiving inter-carrier sound!). Further details may be obtained by contacting Les at his home QTH.

Nice also to hear from our friend in the South — Winston VK7EM. In a letter received recently Winston tells of his proposed experiments on 1296 MHz next summer. Hopefully this will promote activity in VK3 this summer. ■

LETTERS TO THE EDITOR

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

Dear Sir,
Reference the letter by VK6KK Mr. C. Whalley in July AR. I fully concur with all his remarks concerning the DXCC countries lists etc. and also his remarks concerning QSL cards.

Whilst not a DX chaser myself, I found the DXCC countries list very useful as one could tick off the prefix of countries contacted, and at a glance could calculate the number of countries in one's log. It also kept me up to date with any new calls which might have arisen during the preceding year. It seems quite ludicrous to me that a magazine produced for the benefit of the radio amateur should discontinue with this very important service. One can only wonder at the thinking behind the decision.

On the subject of QSL's, as an ex G, I find it difficult to understand why as a member of the WIA I should have to pay for each and every QSL card I send through the bureau, because as an ex RSGB member, I can bear out Mr. Whalley's statement, the RSGB QSL bureau is an absolutely free service to members. Due to the present fantastical high price of having cards printed, plus the extra charge placed on each QSL through the bureau, I no longer automatically fill out a QSL card after each contact, I now wait to receive a card from the other station, before sending off my card. I used to QSL 100 per cent. Whilst on the subject of QSL cards, I understand people wanting their own individual design of card, but for those of us who consider that a QSL card is just a confirmation of a contact, and having regard to the high cost of having QSLs provided, would it not be a good idea for the WIA to design a standard card, have a go at getting them printed at a cheap rate in view of the many thousands which would be required, even if it means having them printed in another country. A space could be left on the card for the station call and address, to be printed in by the operator, or by rubber stamp.

I feel sure that with a little thought these cards could be arranged and I feel sure there would be a ready market in VK for such cards, and with probably a margin of profit for the WIA — what do other members think of the idea?

FRANK BIRD, VK6ZE.

(The DXCC countries list is in the 1977 Callbook — Ed.). ■

The Editor,
Dear Sir,

ROSS HULL MEMORIAL VHF-UHF CONTEST "IS IT AN EVENT OF THE PAST?"

This once remarkably popular contest was first held during the summer of 1950-51 to perpetuate the memory of the late Ross Hull, who did so much towards work in VHF and UHF field. Since the first contest many Australian amateurs of note have participated, among the trophy winners being, in the first year R. V. Galle, 5QR, and since then followed in order 5BC, 4KK, 6BO, 4NG (dec.), 3GM, then the consecutive 3 times winner 3ALZ, 4ZAX, 3ARZ, 5ZDR, 4ZAX, 5ZDR, 3ZER, 3ZDM and 5HP. This takes us up to 1966-67 when my records cease, having at that time obtained these statistics thanks to Peter 3ZPA and David 3QV.

As a long-standing competitor in this contest, having seen many ruthless changes in the rules, I consider I am eligible and competent enough to make these comments for your readers' digestion and thought.

My own humble achievements are the winner of 5 first places in the VK2, three of them consecutive, 1964-65, 1965-66 and 1966-67 and I am particularly proud of these certificates, because they represent three summers in which there were three entirely different sets of rules, mainly as to the duration of the contest for log submissions.

From 1950-51, until 1964-65 there were no rule changes and logs were required for the full 5 weeks duration of the contest. In 1965-66 the WIA decided to shorten log submissions to the best 9 days, consecutively, besides introducing a 48 hour period and in 1966-67, they brought in a period of 7 days, not necessarily consecutive, while retaining the 48 hour period.

Also from 1964-5 to 1965-6 points were abolished for contacts under 50 miles, but this was brought back in 1966-67. As well, there were a number of changes in points awarded for contacts over different mileage ranges over the years, until 1976-77 when the scoring system was changed entirely, with the mileage system being abolishtd in favor of points per contact being made on a State to State basis. This seemed fair enough, when you consider the people who have to check the logs.

Further in 1975-76 the organisers decided to stop issuing certificates to State winners and restricted certificates to first, second and third places in each section, with even this "penny-pinching" attitude being abolished, apparently, in the last contest 1976-77.

The point of my remarks to date, based on facts, leads to the question: "Were all these changes necessary, or were they brought about by 'whinges' from disgruntled competitors?"

Besides, they seem to bring disregard for the man, whose name this contest was "supposedly" designed to perpetuate the memory of and I for one, feel he must turn in his grave at the thought of this state of affairs.

Another question may well be asked, "Where do we go from here, will this once highly regarded contest continue to exist, in view of the seemingly lower number of log entries each year?"

A final question, "Could this be one of many possible causes for the membership of the WIA to be only about 50 per cent of all amateurs in Australia?" My answer being "YES".

Finally, let those responsible get together and give the matter careful thought and introduce a set of rules for future contests, which will remain unaltered over the years, as well as making it "worthwhile" winning or getting a certificate. A suggestion is that you abolish the 7 day and 48 hour periods and if you wish a log submission for less than the full period, then why not re-institute a rule requiring one for say 14 or 9 days, being the best consecutively. As well as re-introducing the issue of certificates for the highest scorer in each call area, leaving the points scoring system as in the last contest, 1976-77, together with the bonuses.

While it may seem hard on some operators, remember my previous remarks and keep it a hard contest to win, as well as being able "to take the good with the bad".

Sincerely yours,
ALBERT F. BIRCH, VK2ZFB/VK2N--. ■

The Editor,
Dear Sir,
I refer to the letter from C. Whalley VK6KK July AR where he comments on QSL Bure changes. I would like to correct him as far as VK2 Division is concerned.

For some time now this Division has had free handling of cards for members. To those who reside in the country areas, the Bureau posts cards at economical intervals.

Our Bureau reports that this has created a marked increase in use of the facilities, with costs remaining low as a percentage of total membership.

By way of general information our QSL address is C/- P.O. Teralba, NSW. 2284. Would all please note that this is the only address and that GPO Box 1734 is no longer an operational address.

T. MILLS, VK2ZTM (President VK2 Division) ■

The Editor,
Dear Sir,

In my letter published in May AR this year on production of Morse practice tests, I stated that the RFMD possessed a morse keyboard. I have since discovered that this is not so. The examinations in Sydney are prepared using such a keyboard, but it is the property of one of the Radio Inspectors and is used by him in the hope that a degree of uniformity can be obtained so that candidates can know what to expect.

My apologies to those concerned.

Yours faithfully,
Mark Salmon VK2DI.

The Editor,
Dear Sir,

The planning of the 432 MHz band is woefully inefficient according to my way of thinking.

My plan is as follows:

420 -425.5	Ch. 1 TV
426 -431.5	Ch. 2 TV
432 -432.5	All tuneable modes
432.5-434.5	FM Simplex repeater in/out beacons
435 -438	Satellite window, Ch. 2A TV
438 -443.5	Ch. 3 TV
444 -449.5	Ch. 4 TV
449.5-450	Experimental.

There are small guard channels between some of the main segments which I have not allocated.

The TV allocations are based on a vestigial sideband standard. If the commercials have a vestigial sideband standard there is no reason why amateurs cannot.

Right now there is a QRM problem on ATV in VK3. In order to make things no more difficult than necessary for the ATVers, it is desirable that ATV channels be as close together as possible. The main limitation here is antenna bandwidth.

In order to make up for the low sideband power of ATV we have to use high antenna gain. There is no way in getting gain of 20 dB or more on

432 over a 20 MHz bandwidth without going to a very large structure e.g. a 20 foot dish.

Ch. 2A TV is a proposed narrow band vestigial sideband suppressed carried system for satellite (or land use when not required for satellite).

Yours faithfully,

J. F. Berwick VK3ALZ.

P.S.: I propose that a deadline be set for the conversion of ATV to vestigial sideband — prior to this a decision will have to be made which sideband to suppress. ■

The Editor,

Dear Sir,

After reading the letter from the VK5 CW Co-ordinator, AR, July '77, and going back to the May and February '77 and the October '76 editions of AR where related letters have been published, I was prompted to put in my "two bobs worth"

I, for one, see what Rodney VK3UG is pointing out in the leading comment of his letter in AR Oct. '76 issue, co-ordination of morse code practice sessions, and, primarily as far as I am personally concerned, publication of times, frequencies and callsigns of those stations taking part in slow morse practice sessions.

As the co-ordinator of the VK2 division mentions, he believes there is a service originating from VK4 and as far as he knows no service from VK3. Well, as far as I know, there is a service in VK3 on 160m, but where, when, on what specific frequency? We could probably continue.

I think my point is plain enough; one person thinks one division is producing a slow morse session, another person does not know anything about it but thinks his division produces a session, on what frequency or time he does not know least of all the station callsign.

How about all bodies that conduct a slow morse broadcast write to Mr Champness and let him know all the details of your service so that they may be published in AR. I'm sure Mr Champness would not mind sparing a few lines for such information which would help the newcomer, and the not-so-new.

("Newcomers' Notebook" is temporarily in recess. We will be happy to publish details of slow morse transmission not now listed in the AR directory (p3) as and when received . . . Ed.)

I personally am well aware of the fine efforts of the VK2 and VK5 Divisions, but what about everybody else that conducts similar sessions?

In closing I would like to touch on the topic of morse standards. The first time I attempted a P and T Morse Examination, I was surprised to hear the morse being sent the way it was. Being a regular listener to the VK2 and VK5 sessions, the only two I am aware of, I have come to notice the difference between P and T machine morse and hand-sent morse at the required speed.

The difference to somebody who has little trouble coping with morse may well be negligible, but it is of great significance to a person who has difficulty with the code, hence Mr Champness's suggestion of machine morse or pretaped morse sent at a higher speed and slowed down. Even I can send better quality morse at 15 wpm than at 5 wpm and I think a lot of people would be of similar opinions.

This letter is not directed at any party or persons, but is intended to shed a little light on what may have been turning into a dark situation.

How about it, State Co-ordinators, I think we will be all better off for it.

Bruce R. Kendall VK3ZDM. ■

QSP

1977 CALL BOOK

The small note about the new call book on page 6 of August AR was written very early in July whilst details were being finalised. This is the first call book produced in the new series and the number of pages for the call sign listings was underestimated by about 20 per cent. The result is that the weight of the call book, containing more pages than originally estimated, will bring it into the 60 cent postage bracket but the cover price remains unchanged at $2.85. Copies should have become available late in August.

VK/ZL OCEANIA Dx CONTEST RULES

The WIA and NZART, the National Amateur Radio Associations in Australia and New Zealand, invite world wide participation in this year's VK/ZL Oceania DX Contest.

OBJECTS

For amateurs of the world to contact VK, ZL, Oceania stations on all bands, 1.8 through to 28 MHz.

DATES

PHONE — first week-end in October; CW — second week-end in October. Starts 1000 GMT Saturday, ends 1000 GMT Sunday.

TYPE OF COMPETITION

1. (a) Transmitting Phone — Single Operator.
   (b) Multi Operator outside of VK/ZL.
2. (a) Transmitting CW — Single Operator.
   (b) Multi Operator outside of VK/ZL.

NUMBER EXCHANGE

To consist of five or six figures, made up of the RST report, plus three figures which commence at 001 and increase by one for each successive contact.

SCORING

OCEANIA STATIONS

2 points for each QSO on a specific band with VK/ZL, 1 point for each QSO on a specific band with the rest of the world.

WORLD STATIONS

2 points for each QSO on a specific band with VK/ZL, 1 point for each QSO on a specific band with Oceania other than VK/ZL.

FINAL SCORE FOR OCEANIA AND WORLD STATIONS is derived by multiplying total QSO points by the sum of VK/ZL call areas worked on all bands. (The same VK/ZL call area worked on different bands counts as a separate multiplier.)

VK/ZL STATIONS

On EACH band, one point per contact, multiplied by the total number of different prefixes worked. Final score to be the sum of the band scores.

VK/ZL ON 80 METRES

As well as to overseas countries, contacts on this band between VK/ZL counts for points. Each call area of VK and ZL to be considered a scoring area.

VK/ZL ON 160 METRES

As for 80 metres, with the addition that contacts between VK/VK, ZL/ZL count for points.

LOGS

(a) Must show in this order: Date, time in GMT, callsign of station contacted, band, serial number sent, serial received. Make separate log for each band used.

(b) SUMMARY SHEET TO SHOW: Callsign, name and address (use block letters please), details of equipment used and for EACH BAND QSO points for that band and total of prefixes.

Sign a declaration that all rules and regulations have been observed.

AWARDS

FOR OVERSEAS STATIONS: Attractive coloured certificates will be awarded to EACH country (call area in USA, Japan, USSR) on the following basis:

(1) Top scorer for the country.

(2) Other certificates will be awarded; 2nd and 3rd and separate band awards, depending on activity for conditions prevailing.

(3) Where there is a high participation from any call area, a WIA plaque will be awarded to top scorer with separate plaques for Phone and CW.

VK/ZL STATIONS: Certificates will be awarded as follows:—

(1) Top scorer on each band for VK and ZL.

(2) Top scorer in each VK and ZL call area.

NOTE: There are separate awards for Phone and CW.

RETURN OF LOGS posted to reach —

VK/ZL Manager, WIA, GPO, Box N1002, Perth 6001, Western Australia,

or

N. Penfold VK6NE, 388 Huntriss Road, Woodlands 6018, Western Australia,

before 1st January, following the contest. ■

MAGAZINE INDEX

Syd Clark, VK3ASC

BREAK-IN May 1977

A 14 MHz DDRR Antenna; IC Linear Capacitance Meter; Some Ideas for Home Brewing; OSCAR Orbit Predictions; A Tunable Active CW Filter; The Colour TV Trap; FM Receiver Specifications; The "Long Over" Eliminator; Operating Portable in Fiji.

HAM RADIO HORIZONS March 1977

This is a new publication from the publishers of "Ham Radio". HRH Interviews FCC's John Johnston; Riding High with OSCAR Satellites; The Not-so-Rocky Road from CB to Ham; The Golden Years of Radio; A Simple Audio Oscillator; The Far Horizon — An Evening of DX; Taking the Mystery Out of SSB; Get on the Air on a Budget; DX Propagation and Forecasting.

QST May 1977

Keying Waveshape Correction Circuit; Propagation — Past and Prospects; Slant-Wire Feed for Grounded Towers; The 5 x 3 Power Supply; Independent Sideband for Your Drake TR-4C; The Stark Key; A Fully Automatic Morse Code Teaching Machine; An Ultramodern Linear Amplifier; Your First Receiver — How to Choose It.

SHORT WAVE March 1977

Austin Forsyth, OBE, G6FO; Design for a Telescopic Tilt-Over Mast; Notes on Power Supply Design Using Three Terminal Regulators; Beginners' Guide to OSCAR

SHORT WAVE April 1977

A 40 watt PEP Linear Amplifier for Two Metres; All-FET Transmitter for Top Band; Simple Receive Adaptor; Weatherproofing a Dipole; QRO Power Supply for Transistor Equipment; Calibrating Your Reflectometer; Lecher Lines; Dial Lighting the Trio 2200GX. ■

20 YEARS AGO

Ron Fisher, VK3OM

SEPTEMBER 1957

Amateur Radio of September 1957 contained one of those rare articles that instantly creates a sensation. VK5AX's "All-Band Pre-amplifier without Band-Switching" was immediately being reproduced by amateurs and short wave listeners all over Australia. Designed to cover the range from three to thirty megahertz with an "All-Band Tank Circuit" and provide a large amount of RF gain, it was just the thing to pep up the old AR7 or AR8 that was getting a bit over the hill. Two 6AC7's, one as the RF stage and the second as a cathode follower output, were used. All the bits needed were in every junk box.

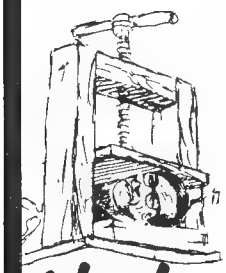
Other technical articles for September included "A Two Metre Long Yagi", by Ian Berwick VK3ALZ. It was indeed long, the boom being nearly ten metres.

Ninety Degree RF Phase Shift Networks, by N. L. Southwell VK2ZF, described quarter-wave co-ax. line networks and delay line type networks. Part five of "Modifying the AR7 Receiver", by Gordon Bowen VK5 U, showed how to obtain full 20 metre band-spread with the Band E coil box. The Editorial page urged a greater use of reference books in Amateur Radio research. They suggested the use of Divisional and Public Library facilities. With the rapid expansion of Municipal Libraries over the last few years, these services are available to us all. However, I have noticed that in general, books on amateur radio are not well selected. Have a word to your local Librarian, they are always pleased to receive suggestions.

What did the Hamads have to offer in September 1957? How about an Eddystone 640 receiver at $54, or a modified 522 transmitter at $30. Perhaps an unwired power supply with 800 volt and filament transformers plus chokes at $50 might be more to your taste. ■

YOU'VE CONVINCED US!

We've realised the error of our ways— now the high-performance Yaesu FRG-7 is back in all our stores (and many of our dealers!)

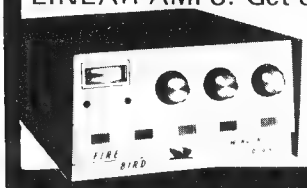


ok—I give up!

The ultimate in a general coverage receiver continuous tuning from 550kHz to 30MHz, fully synthesised for ultra stable reception in AM, SSB or CW modes. Sensitivity is better than 0.25uV (SSB) for 10dB S+N/N. Uses the famous 'Wadley Loop' principle ; operates from 240V mains or 12V battery. 52 ohm antenna. **A really incredible receiver! Cat D-2850.**

YAESU FRG-7 $328.00

LINEAR AMPS: Get one before the pirates grab 'em!



(Left) This one covers 40, 20 & 10 metres, 200W input from just 3W of drive! Also has RF preamp, switching is RF actuated. 240V AC operated.
Cat D-2544 .. .. $299.00
(Also available) 10 metre linear, 12V DC, 50W from 3W drive
Cat D 2545 .. .. $189 00

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TS-820 transceiver — one of the best around	Cat D 2110 ..	$940.00
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DC to DC converter for the TS-820	Cat D-2113	$74.28
TS-520S transceiver — for the budget minded. .. .	Cat D-2520 .. .	$690.00
CW Filter for the TS-520	Cat D-2521	$60.50
TS-700A transceiver — fantastic 2m rig.	Cat D-3100	$630.00
TS-600A transceiver — all modes on 6m	Cat D-3106	$699.00
TR-3200 transceiver — UHF hand-held	Cat D-3200	$305.00
TR-7200 transceiver —budget 2 metre rig	Cat D-3215	$260.00
TR-7400 transceiver — 25 watt, 2 metre	Cat D-3400	$429.00
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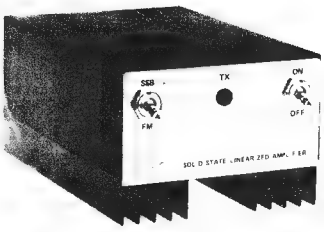

80W, 144-148 MHz, FM, SSB
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HF-3-100L2 Amplifiier (new model)

Frequency Range	3-30 MHz
Input Power	10W Nom., 5-20W PEP range
Output Power	100W Nom., ±½ dB across band, 200-250W PEP output
Input Impedance	50 ohm nom., adjustable to match exciter range under 2:1 across band
Output Impedance	50 ohm nom., up to 3:1 VSWR acceptable with little degradation
Current Drain	16 A nom., 20 A supply recommended at 13.6V DC
Power Supply	13.6V DC recommended for best results, 11-14V DC acceptable positive or negative ground
Pre-amp	18 dB nom. gain across entire HF band, 15 dB typ. at 50 MHz, 3-4 dB NF
Size	19.1 x 16.5 x 8.9 cm. Weight 1½ kg

2M10-80L Amplifier

- All solid state — microstripline design.
- Broadband — requires no tuning across band.
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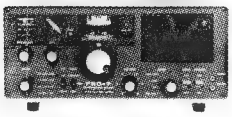

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Eric Jamieson, VK5LP
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VK0	VK0MA, Mawson	53.100
VK1	VK1RTA, Canberra	144.475
VK2	VK2WI, Sydney	52.450
	VK2WI, Sydney	144.010
	VK2RHR, Mittagong	144.120
VK3	VK3RTG, Vermont	144.700
VK4	Mt Mowbullan	144.400
	VK4RBB, Brisbane	432.400
VK5	VK5VF, Mt. Lofty	53.000
	VK5VF, Mt. Lofty	144.800
VK6	VK6RTV, Perth	52.300
	VK6RTU, Kalgoorlie	52.350
	VK6RTW, Albany	52.950
	VK6RTW, Albany	144.500
	VK6RTV, Perth	145.000
VK7	VK7RNT, Launceston	52.400
	VK7RTX, Lonah	144.900
	VK7RTW, Lonah	432.475
VK8	VK8VF, Darwin	52.200
KG6	KG6JDX, Guam	50.110
KH6	KH6EQI, Hawaii	50.104
ZL1	ZL1VHF, Auckland	145.100
	ZL1VHW, Waikato	145.150
	ZL1VHF, Auckland	433.100
ZL2	ZL2MHF, Upper Hutt	28.170
	ZL2VHP, Manawatu	52 500
	ZL2VHF, Wellington	145.200
	ZL2VHP, Manawatu	433 250
	ZL2UHF, Wellington	433.000
ZL3	ZL3VHF, Christchurch	145.300
ZL4	ZL4VHF, Dunedin	145.400

A letter has been received from Graham VK8ZCJ in Darwin which, amongst other things, straightens out a few inaccuracies in the beacon list. It appears HL9WI is no longer operational, and serious doubt exists about the Japanese beacon which he thought had moved to 52.500 but was very doubtful if it was on the air. Both of these stations have been removed from the beacon list for the time being. It appears also to confirm no Hong Kong TV exists on 51.750, but the TV station on 49.750 is a very good pointer to openings to the north, and might well be shown as a beacon!

Graham goes on to say things have been relatively quiet in Darwin throughout June and July, although on 24/6 he worked JA6RJK, JA6RUR and JR6RPQ around S8 at approximately 1350Z. On 27/6 and 28/6 he worked Lyell VS6BE in Hong Kong around 0900Z, peaking to S6 with slow QSB with deep fades. Lyell was on 50.1 and Graham on 52.1 MHz. Lyell is now using a TS600A instead the FTV650 due to the former being capable of . Sufficient interest has been aroused in Hong Kong over TEP to Australia that Lyell has written to the local P. & T. people for an amateur allocation from 52.000 to 52.200!

Brian VK8VV has sighted the VL5SA beacon operating on 48.450 MHz, which is run by WRE, and temporarily located at H.M.A.S. Coonawarra near Darwin, running 100 watts to a four element yagi pointing north! Thanks for the letter, Graham.

George Francis, that doyen of FM operation, has written from his new location, C/- Elcom Training College, P.O. Box 1105, Boroko, Papua New Guinea, with some news of happenings on that big island to our north. He advises already showing an interest by joining the PNG Amateur Radio Society and being elected on the publications Committee. The only novice so far there is Ron P29NRP, who operates 3560 kHz nightly and week-ends. George has been included in the VHF Sub-Committee which is co-ordinating and planning a 2 metre repeater for the Port Moresby area. The 2 metre FM channel mainly used throughout PNG at the moment is Channel 40, and is a 24 hour net. George monitors Channel 50 and 52.050, and sometimes 144.100 SSB. The only high band opening since his arrival was on 28/3 when for two hours he watched Channel 7 TV from Townsville, 800 miles away, and good enough for colour on peaks, but no sign of the Townsville 2 metre repeater located on the same mountain.

George is located on the northern side of a mountain peak which effectively blocks his view of Australia, hence he does not enjoy the Channel 9 and 10 reception from Cairns received by those living on the southern slopes of the same mountain. However, he does have good views to the north-east, including north around to south-east, which will possibly have some compensations as time progresses.

His six metre activity started with a contact on 27/3 with Garry P29GR, who has now returned to Brisbane as VK4AR. The other local six metre operators are Ken P29ZDU, Hugh P29BH and Lea P29LS. Graham P29DJ is also active from the gulf on a timber mill on the Erg River near Berena. Those with 6 metre gear include Tom P29KE Rabaul, P29GA at Lae, P29CM (ex VK2BBU) Rabaul, and possibly others. George's first real DX was on 16/4, when he worked Ross VK4RO, Hal VK4DO, Lyn VK4ALM and Mario VK4MS, plus hearing Channel 0 from Brisbane.

Graham P29DJ, along the gulf, reported 14/4 hearing strong JA's around 51 MHz but nothing on 52 MHz. George finally worked his first JA's on 23/4 with signals to S9+, being JR1AUW and JA1LZK, both in Tokyo. Literally "thousands" of Japanese stations were heard from 50 to 52 MHz but only two above! His general observations so far indicate they have an equinoxial DX season period there to north and mid Queensland, as he worked from Cairns down to Bundaberg on April 16, 17, 24, 26, 27 and 4/5. Nothing for the rest of May, then on 5/6 with Peter VK4ZPR portable west of Bundaberg, and others in Townsville, Ayr, etc. Since then on 4/7 he has only heard Ch. 0 in Brisbane, and makes the observation that possibly the winter minor solarice period Es does not extend to the tropics or Equator, as they heard none of the good openings occurring between VK3-VK5 and VK4 on 2/7. Thanks, George, for your letter, would be pleased to hear from you again some time.

NOW READ THIS

If you have not already established the thought after reading the relevant parts of the above two letters, then let me put you right. I have mentioned the fact before, and I now repeat, we are very severely disadvantaged in VK through the loss of the lower 2 MHz of the 50 to 54 MHz band. Many times we could establish contact with other countries but for the large difference in frequency. How many of you who operate on six metres would be prepared to support a move to try to obtain operation also in the range of 50 to 52 MHz? There are several avenues for thought: (1) Straight-out availability of 50 to 54 MHz; (2) Agreement to allow VK operators to VFO down to 50 MHz to call a station in the range 50 to 52 MHz and ask him to come up into the 52 MHz range; (3) The provision of a segment say between 50.000 and 50.500 MHz for our operation; and (4) Possibly some improvement would be to increase the allocation to allow us to operate down to 51.000 MHz, which is an area used by overseas countries and New Zealand. Each of these arrangements would be on a non-interference basis to existing services. However, that clause is not really any different from the present situation, no operation even on 52 MHz is tolerated if it causes any interference to other services, viz., Channel O TV, etc.

If you are sufficiently interested would you please write to me straight away (don't put it off until tomorrow, you may forget) and set out any thoughts you may have on the above four suggestions, and any others you yourself may think of at the time. If we can get enough people to show sufficient interest to write, it may be possible to present a case for non-interference operation. What do you think? Is it worth a try? Just remember, during the past few days prior to preparing these notes, we had the use of the 27 MHz band withdrawn from our usage as from 26/7/77 to make it available for the CB service. Perhaps we could look at the above suggestions in the light of some compensation for the loss of that band. It's over to you.

Ron Mould VK6FM, ex VK3AGK, of Derby, the land of the Baob trees, writes with some news of happenings in that area since moving there a while back. He is operational on 144 MHz SSB, using a 15 element 28 foot boom yagi and looking for skeds. Ron was unable to take his 23 cm equipment with him and this is stored in Melbourne. After a 16 months stint in Derby he still will be going to Perth and hopes to retire there, from where there are plans to build a 20 foot dish for 23 cm.

Ron operates on 3592 kHz each night on the WICEN net, and also on 14106 kHz at 0300Z each week-end, and on every second Tuesday. He supports the suggestions already made re an HF net for VHF operators and would favour 14 MHz.

Like the rest of us, Ron was greatly grieved at the passing of Ron Wilkinson VK3AKC, and in recognition of the great amount of work Ron did for amateur radio and VHF/UHF in particular, he suggests something be done to recognize this work, and suggests either re-naming the summer VHF contest to be the Ross Hull-Ron Wilkinson Award, or that a trophy be made available each year to the outstanding VHF/UHF feat by an Australian amateur operator. To assist in any suggested thoughts he is prepared to donate $100 to start such an award. That's a generous offer, Ron, and I will see what can be arranged. In the meantime, those of you who are prepared to write to me re the suggested band-changes to six metres might like to comment on the above suggestions re a memorial to Ron Wilkinson. Let me know soon, please, so it may be passed on to the appropriate people at Federal level. And would anyone else like to add to the 100 already promised?

MOONBOUNCE REPORT

From Lyle VK2ALU via "The Propagator". The EME 432 MHz tests for VK2AMW on 25/6 resulted in a contact with W7GBI, with M reports both ways. XE1RY and JA6CZD were called as scheduled but neither was heard. Our echoes were up to 7 dB over noise.

Half an hour of the test period was lost while fractured bolts were replaced in the bottom bearing of the main drive shaft. These will now be replaced with high tensile bolts.

Arrangements have now been finalised and material received for the construction of the new wave guide feed system.

Evidence was found on 25/6 of break and entry into the moonbounce site buildings by vandals. Windows were broken and material strewn over floors, cupboards and doors were opened and contents removed. Fortunately the locked equipment cubicles were intact. All items of easily removed equipment are now being taken away between tests and this will lengthen the setting up time prior to the carrying out of tests. (Seems nothing is safe these days . . . 5LP.)

GENERAL NEWS

The South East Radio Group at Mt. Gambier again held a very successful convention over the June holiday week-end. Once again the weather was kind to the 70 or so amateurs and their families and friends who attended The SERG trophy was snatched from the VK5's this time by the team of VK3AWY and VK3AMZ, and we congratulate them.

The time of the year is with us as these notes are written during which activity on the bands generally sinks to a rather low state, no doubt hastened by the coldness of the weather and the fewer contacts available. I, too, have been on leave and hence not so much on the air, but looking around since returning to work indicates I have not missed much.

I will close now, and leave a little extra space for someone else, but please write to me on the two matters mentioned in these notes. Closing with the thought for the month: "A bore is someone who persists in holding his own views after we have enlightened him with ours."

The Voice in the Hills. ■

AMATEUR EQUIPMENT REPAIRS
Contact MALCOLM WHITE VK3MW
at **BOZAK AUSTRALASIA**
5 Birdum Street, Moorabbin, Vic. 3189
Phone (03) 95 6447

CONTESTS

Kevin Phillips, VK3AUQ
Box 67, East Melbourne, 3002

CONTEST CALENDAR

September

10/11	European Phone Contest
10/11	Albatross SSTV Contest
14/16	YLRL "Howdy Days"
17/18	Scandinavian CW Contest
24/25	Scandinavian Phone Contest

October

1/2	VK/ZL/OCEANIA PHONE CONTEST
8/9	VK/ZL/OCEANIA CW CONTEST
14/16	Jamboree of the Air
15/16	Manitoba QSO Party
15/16	RSGB 7 MHz Phone
29/30	CQ WW DX Phone Contest

November

5/6	RSGB 7 MHz CW
12/13	European RTTY Contest
19/20	WWDXA CW Contest
26/27	CQ WW DX CW Contest

SCANDINAVIAN CONTEST—CW SEPTEMBER 17-18, PHONE SEPTEMBER 24-25

Starts 1500 GMT Saturday, ends 1800 GMT Sunday. This is the world working the Scandinavians in this contest. The same station may be worked on each band 3.5 to 28 MHz for QSO and multiplier credit. Phone and CW are separate contests.

There are classes for single and multi-operator, single and multi-transmitter. Multi-transmitter stations must use a separate serial number series for each band. Club stations are considered multi-operator.

Exchange RS(T) and QSO number starting at 001.

Points: For European stations 1 point for each QSO on any band; for non-Europeans, 1 point per contact on 14, 21 and 28 MHz and 3 points if it is on 3.5 or 7 MHz.

Multiplier: Each Scandinavian call area from the following list worked on each band. (LA1, LB1, LJ1 are in same call area as are SM3, SK3, SL3.) Portable stations in Denmark or Norway count as the 10th area. OH0 is the 10th area for Finland with OJ0 as a separate area.

Prefixes used in Scandinavia are: LA/LB/LG/LJ, Norway; JW, Svalbard; JX, Jan Mayen; OF/OG/OH/OI, Finland; OH0, Alan Is.; OJ0, Market Reef; OX, Greenland; OY, Faroe Is.; OZ, Denmark; SJ/SK/SL/SM, Sweden.

Final score is the sum of QSO points from all bands times the sum of multipliers from each band.

Certificates will be awarded to the highest scoring station in each class, both phone and CW, in each country. Use a separate log for each band. Include a summary sheet showing scoring, your name and address in block letters, and a signed declaration. Send logs to the NRRL Contest Committe, P.O. Box 21, Refstad. Oslo 5, Norway, by October 15th.

CLASSIC RADIO EXCHANGE

Starts 1800 GMT Sunday, September 25th, and ends 0100 GMT Monday, September 26th. The object of this activity is to restore, operate and enjoy older equipment with like minded amateurs. A Classic Radio is any piece of equipment built since 1945, but at least 10 years old. (An advantage, but not required to enter.) The same station may be worked on each band and mode and with different equipment combinations, but no AM phone below 21 MHz.

Exchange name, RS(T), State, province or DX country, receiver and transmitter type (i.e. home brew, 807 final, etc.). and any other interesting information.

Scoring: Add the number of different transmitters and receivers, States, provinces and DX countries worked on each band. Multiply by the sum of QSO's made. Multiply that total by the Classic multiplier. (Total years old of all transmitters and receivers used. Minimum of 3 QSO's per unit.) Multiply years by 2 if it's a transceiver. Frequencies are CW 60 kHz from bottom of each band, phone 3910, 7280, 14280, 21380, 28580 kHz.

Awards for highest scorers, longest DX, most equipment combinations, oldest equipment, and "unusual achievement".

Send logs with comments, pictures, anecdotes, etc., to Stu Stephens K8SJ/W8KAJ, 2386 Queenston Road, Cleveland Heights, OH4418. ■

IONOSPHERIC PREDICTIONS

Len Poynter VK3ZGP/NAC

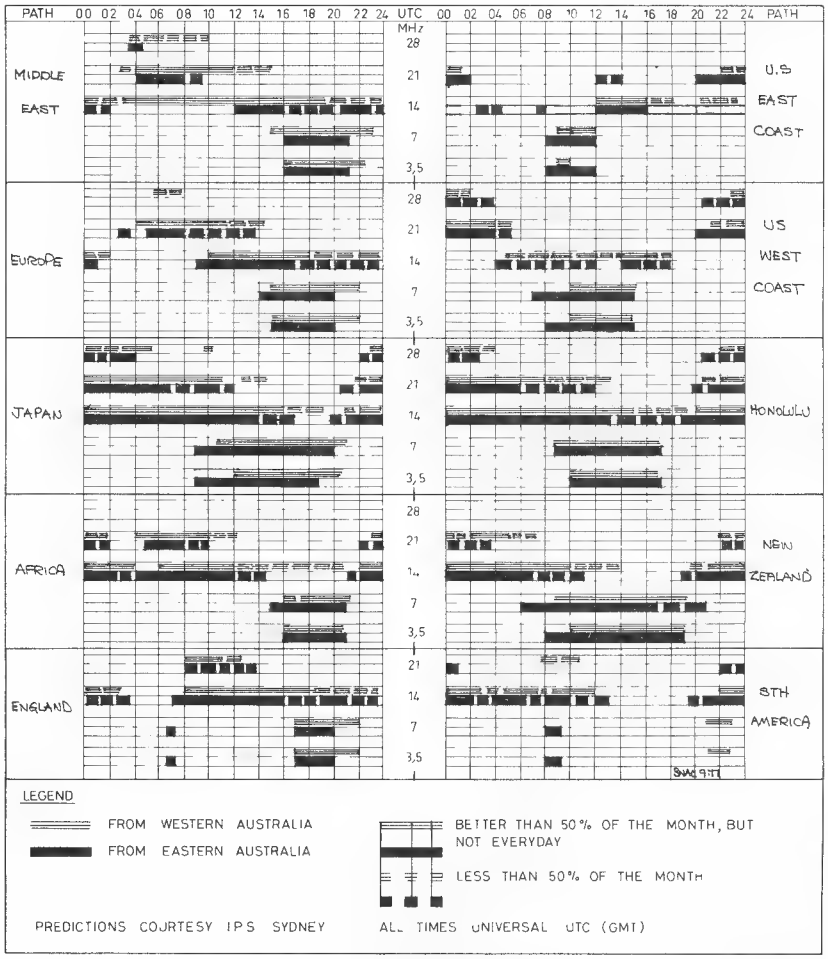
There are now encouraging signs that the new angle is showing signs of life. June produced an upwards surge in solar activity producing a mean of 38.4. The last week in June produced some of the highest daily counts for some months. However, July did not follow suit and conditions reverted to average for the period.

The interesting period now appears to be the September-December season, when path openings should attain a higher degree of reliability and regularity. Looking at the September charts, there is ample evidence of some forthcoming 28 MHz openings other than North-South. When conditions are better than those that these charts are based on there is ample scope for exploration on 28 MHz. In spite of only a poorly ionised region in existence, the influx of Novices will nevertheless have an impact on this band. Certainly the Novices will be able to enjoy some real DX on their new allocation of 28.1-21.6 MHz. Many already have succeeded in working both JA and W stations.

Once again listen to WWV at 18 minutes past each hour for the solar indices. Solar flux figures in excess of 100 and A index lower than 12 and a quiet geomagnetic field should indicate above average conditions. The chart looks good for 75-85 per cent of the month for the solid bars/lines.

Forward predictions for the running smoothed numbers are Sept. 24, Oct. 26, Nov. 28, Dec. 30, with the running smoothed number for Dec. 1976 being 14.7.

Good DX. 73's de VK3NAC. ■



25th Annual
South West Zone
Convention
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OCTOBER 1st and 2nd, 1977
Details from: **GRIFFITH RADIO CLUB**
Post Office Box, Griffith, 2680

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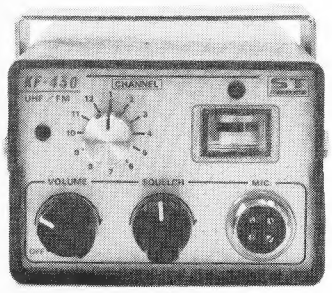

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INTRUDER WATCH

Alf Chandler, VK3LC

Some members have indicated that they do not feel inclined to submit regular reports unless we tell them what successes have been achievd recently. Success in this game is very hard to define, and still harder to come by. All that can be done by our administration, or any other administration for that matter, is issue complaints (a sample of which was promulgated in my column last month) to the countries concerned. International compliance is the only answer. If countries, and I am not referring particularly to Western countries, will not take notice and act upon complaints, nothing else can be done, and such a case can be seen by the fact that the Russian Pulse transmission still persists although having been often complained about by many countries.

A momentary success was achieved by our Telecom representative who went to the Broadcasters' Conference and, by representation "off-the cuff" to the Indonesian representative, managed to get a respite from the 7070 kHz Republic of Indonesia broadcast. However, I believe that station is now back on the air again.

Our Region 1 Co-ordinator is doing work of importance. He is taking out a computerised summary of all complaints, world-wide, submitted from 1969 until the present time, for consumption at WARC 79. This, I can tell you, will be an enormous document, and should carry great weight at the Conference.

While in England I will be staying at the QTH of Colin G3PSM, the Region 1 Co-ordinator, and I shall be viewing this summary. I hope to report fully on my return. ■

PROJECT AUSTRALIS

Bob Arnold

VK3ZBB

Persistent rumours would indicate that a Russian OSCAR is in orbit and will be opened for communication on October 4 — the 20th Anniversary of the launching of Sputnik 1. No details of orbital path or frequency of operation are known. If information comes to hand, it will be relayed to Federal Office for inclusion in Divisional broadcasts.

Are you preparing for future satellite activity?

The first AMSAT Phase 3 spacecraft is scheduled for operation in 1979. Its elliptical orbit will provide contacts for hours at a time with countries never before reached from Australia by VHF — and with no skip zones!

Oscar 6 is showing real signs of old age, having completed over 22,000 orbits which is well over four times its design life.

Oscar 7 is nearing its design life span of three years and it is therefore considered prudent to build a further low-orbit satellite which will be known as Oscar D until its launch later this year.

Oscar D and the first of the Phase 3 spacecraft will each carry transponders for Mode A (145.9/29.5) and for the new Mode J (145.9 Up/435.15 Down). Phase 3 spacecraft will be accessible with full quieting SSB or CW signals by any amateur station using an output power of 50 mW and small rooftop style antennae. In fact, it is estimated that the performance of this equipment will be superior to a kilowatt/quad combination on the HF bands. Furthermore, tracking of Phase 3 spacecraft will require less expertise and QSOs will be open for much longer times than with Oscar 6 and 7.

Unfortunately, none of these revolutionary facilities can be provided without cost and we need the ssistance of all who have used Oscars 6 and 7, or of those who wish to be to the fore in this new era of amateur radio.

How can you help?

There are several ways:

— Become a member of AMSAT, the world-wide organisation of radio amateurs and national bodies (including WIA) formed to co-ordinate amateur satellite activities.

— Membership of AMSAT is only $US10 per year — a donation of $US100 will make you a life member.

— For this you receive the quarterly AMSAT Newsletter and information on future spacecraft, operating news etc. (It also saves a hassle if your editor or I forget to include the monthly tracking data).

— Persuade your Radio Club to become a member of AMSAT ($US12 p.a.).

— Or you can specifically help the Phase 3 programme by sponsoring part of the satellite: solar cells $6 each, battery cells $120 each, transponders $3000, rocket motor $6000, etc.

Your help will be appreciated — if you require further information write to Dave Hull VK3ZDH or myself, or route a note through your Division.

New stations heard on Oscar 7 include:

— **Mode A** FK8BB.

— **Mode B** VK4ZRQ, ZL4BM, ZL4PG.

Finally information from Charlie VK3ACR indicates that the QUAGI Antennae described in QST April 77 are first-class for satellite work as well as for terrestrial contacts.

ORBITAL DATA — SEPTEMBER 1977

	OSCAR 6			OSCAR 7			
	Orbit	Time		Orbit		Time	
Date	No.	Z	°W	No.	Mode	Z	°W
1				12783	B	0123	75
2				12795	A	0022	60
3	22332	0127	85	12808	B	0116	73
4				12820	A	0016	58
5				12833	B	0110	72
6				12845	A	0009	57
7				12585	B	0103	70
8				12870	A	0003	55
9				12883	B	0057	69
10	22419	0011	66	12896	A	0151	82
11				12908	B	0051	67
12				12921	A	0145	81
13				12933	B	0044	65
14				12946	A	0139	79
15				12958	B	0038	64
16				12971	A	0132	77
17	22507	0051	76	12983	B	0032	62
18				12996	A	0126	76
19				13008	B	0025	61
20				13021	A	0120	74
21				13033	B	0019	59
22				13046	A	0114	73
23				13058	B	0012	58
24	22595	0130	86	13071	A	0107	71
25				13081	B	0006	56
26				13096	A	0100	70
27				13109	B	0155	83
28				13121	A	0054	68
29				13134	B	0148	82
30				13146	A	0048	66

As it is unlikely Oscar 6 will be on for any length of time, only weekly predictions are given.

To extrapolate: Orbit Period is 114.994 min. Longitudinal Increment is 28.7° per orbit. ■

HAMADS

- Eight lines free to all WIA members. $9 per 3 cm for non-members.
- Copy in typescript please or in block letters to P.O. Box 150, Toorak, Vic. 3142.
- Commercial advertising is excluded.
- **QTHR means address correct in 1975 edition of Call Book (might also be correct in 1977 edition). Next month onwards means correct in 1977 Call Book.**

FOR SALE

Yaesu FRG7 comm. Rx, exc., cond., 3 months old, manuals, etc. $300. Also Hallicrafters SX100 Rx, good cond., $200 or nearest offer. Ph. (053) 31 1138.

Robot Slow Scan TV model 70 monitor, as new, $225. Unique antenna tuner (USA) $75. VK1BH, QTHR. Ph. (062) 88 6062 or (062) 65 5347 bus.

Collins KWM2 transceiver, perfect order, complete with power supply, $1500. VK7AZ, QTHR. Ph. (002) 44 1165.

Kyokutu Synthesised 2m Transceiver, 12W, as new, plus 5/8 wave magnetic antenna, fully regulated power supply and full Ringo base antenna, $300 the lot. Eric Bierre VK2BEK. Ph. (02) 476 5096 evenings.

AWA MR20B on 52 525 MHz, FM transistor PSU, 6146 final 25W, compact dashmount control unit with S meter, etc. and log cable, absolutely P/C, any test, $60. Lafayette HA800 communic. Rx, 80, 40, 20, 15, 10 and 6m, as new, in carton, cost $205, sell $95. Power supply, NIDAC, 10V-15V at 1 amp, precision regulated (723 and 2N3055), $18. 4 x 6146s, unused, $8 each. 12V cradle relays, D/CO contacts, $2 each. VK4ZFM, 3 Belbora Road, Shailer Park, Qld. 4128. Ph. (07) 209 8105.

Transceiver Pye No. 62 Mark 2, 5W AM or CW, VFO or plug in xtl operation 1.6 to 10.0 MHz, runs from 12V, solid state DC/DC converted built-in, also built-in aerial tuning unit, comprehensive metering, circuits and service info. included, works well, $60 ONO. VK2HS, 23 Brisbane St., Bondi Junction 2022. Ph. (02) 387 2492.

Drake TR4C Transceiver with AC4 240 P/S (both as the current model), 10-80m, SSB, AM, CW, 300W PEP input, with handbook, also complete set of new tubes and transistors to suit (spares), no microphone. VK2ZWG (full call arriving soon). Going solid state. $450 ONO. Ph. Geoff (069) 42 1392.

FT220 2m Transceiver, very little use, just 3 years old, new condition, AC and DC powered, FM, CW and SSB modes, reason for sale: unable to find time to use it. $400 ONO. VK3ATR, QTHR. Ph. (03) 336 1054.

Scully record cutting lathe, incomplete, with recording amplifiers but no cutting head, some parts damaged or missing. $150.00. VK2AUI, QTHR.

One Philips type SVC/100L manufactured for US Navy, freq. 1.9 MHz to 21 MHz continuous. All units plug in from front. Ideal for RTTY or to use 813 final with its Z match as linear ceramic insulation and high Q circuits; very stable VFO; auto X former, 90 V to 260 AC. $220. Also over 200 tubes. VK5LC, QTHR. Ph. (08) 71 6841.

IC202 with all xt's, new in carton $195. Full kit of parts for solid state linear 80W PEP for above $50. Complete RTTY terminal TTL-2 as per ARRL handbook $100. Creed 7B teleprinter, teletype Tx distributer, teletype tape-punch and printer, $100 or will separate. Full kit of parts for solid state RTTY demod. $30. Hi-mound morse keyer $50, as new. Peter Milne VK3BEJ, QTHR, or Ph. (050) 24 5814.

Heathkit HR-10B Rx — 80 to 10 m, built-in 100 kHz xtal cal, AM/SSB, perfect condition, ideal for SWL or as a standby Rx for the shack, $100. Creed 7B Teleprinter, complete with sound cover in good condition $45. D. Hides L60142, 32 Thorpe Street, Morley, W.A., 6062. Ph. (092) 75 2698.

SSTV fast/slow digital converter W6 MXV design, full, half, quarter frame, video invert, grey scale $200. Stan VK3BHZ. Ph. (060) 71 6211.

Xt's for TR7200 Kenwood Txcvr; transmitting 144.48, 144.56, 144.60, 144.72 145.00, 145.15, 145.32; receiving 144.25, -.48, -.56, -.60, -.72, -.80, 145.00, -.15, -.32, -.75, -.80, -.85. Best offer or swap 10-80 m vertical antenna. C. T. Somerville, Ph. (03) 795 4638 after 6 p.m.

FT200, mint cond., complete with manual, $425. VK3EB, QTHR. Ph. (03) 41 5037 Bus.

FT200 with DC and AC power supply. All 10 m xt's. Black matt cabinet, with manual's $350. FTV 650 with manual $150. IC202 with Oscar crystal $150. Going mobile. VK5ZBH, Mike Admams, Ph. 295 Ceduna between 8 a.m. and 4 p.m.

2 El-20 m Monoband Beam $37.50. VK3PR, 6 View Court, Leongatha, 3953. Ph. (056) 62 2711.

Philips cathode ray oscilloscope model GM5653 and elctronic switch GM4580/02 $35 pair. Philips 1676 6 m AM complete $30. VK3SM, QTHR. Ph. (03) 386 4406.

Hy Gain vertical antenna type 14 AVQ, fitted with 80 m base loading coil and relay giving 10-80 m covrage, $50. VK2AQW, QTHR. Ph. (02) 449 3538.

Toroid cores for transmit baluns e.c., similar to p. 581 of 1977 ARRL handbook. Take legal power 3-30 MHz, $7.55 ea. plus postage. VK3AGF. Ph. (03) 379 6524. 74 Hillsyde Pde., Strathmore, 3041.

Yaesu FL50 Transmitter and FR50 Rx, with manuals. Excellent condition, combine as transceiver $320. VK3BMJ, QTHR. Ph. (03) 879 3209.

TS820 Digital readout. Must sell as buying a Collins S-line. $950 or near offer. VK2XU, 8 Lake Road, Port Macquarie, 2444. Ph. (065) 83 2175 A.H.; (065) 83 2127 Bus.

Drake R4C Rx, T4XB Tx, TC2 2 m transmit converter, CC1 converter console, power supplies to suit. Hygain 215, 15 el., 2 m Yagi, Geloso 432 MHz converter and Geloso power supply. Home brew transistorised transmit converter and power supply. 3 el 20 m beam. 160 m linear 400 W. VK5AS, QTHR. Ph. (086) 82 2899.

IC22A, repeaters 2, 3, 4, 6, 7, 8. Simplex 40, 50, good condition, no mods., mic., manual, original carton, $175. VK3UJ, QTHR. Ph. (03) 874 5632.

8 only 2 mfd. 3000V w filter capacitors, $120 the lot plus delivery. Set of matched crystals for Kenwood 2 FM simplex channels 49, 51, 53 and repeater channels 3, 5, 7 all brand new imported, $10 per pair. VK3ML, QTHR. Ph. (03) 20 7780.

1 IGL 2 metre FM Txcvr. with chs. 37, 40 and repeaters 2 and 8. Provision for 6 channels. 600 milliwatt output, supplied with a tested but unused 3 watt amplifier. Circuits supplied, set fitted into professionally made case, $65. Rodney Champness VK3UG, 31 Helms Court, Benalla, 3672.

Yaesu FT2F. 2 m FM transceiver with Ch. 37, 40, 50, R2, R4, R8 with mic., mobile mount and instr. book, $110. VK3OM, QTHR. Ph. (03) 560 9215.

Barlow Wadley receiver .5 to 30 MHz, late model, in very good order $190. VK3OM, QTHR. Ph. (03) 560 9215.

VHF gear, tubes new QQVO3-20A $10 each. QQVO6-40 $12. QVO4-7 $3. 2E26 $4. 5763 $3. EC91, ECC91, EF91, EF95, 6AK5, Z77 $2 each. Eddystone split stator caps type 583 15 x 15 PF or 25 x 25 PF $4. Power transistors for LV regulators 2N1490 or 2N1514 $5 each. Xtals B7G base 7027, 7066 or 7083 kHz $4 ach. 14080, 32500, 34000 kHz $4 each. Field strength meter Eagle type RF-45 ideal Novice/CB user $8. Joystick antenna 1.5 to 30 MHz CW type 5 ATU and feeder $20. VK2BFJ, 90 Wyong Road, Killarney Vale, 2261. Ph. (043) 32 5758.

DX 160 Communications Rx, 140 kHz to 30 MHz, solid state, excellent condition $155. KW Electronics LP filter, 5 section, 1 KW, as new, $35. Ringo ARX2, gamma loop matched vertical, 6 dB gain, excellent 2 m antenna, excellent condition, $25. VK3LJ, QTHR. Ph. (03) 32 3412.

Kenwood TS 520 plus ext. HF oscillator, complete with mobile leads and matching microphone, as new condition, very little use, never used mobile. The two units for less than new price of Tx alone. Sell for $550, no offers. Contact G. Matheson, VK4WU, QTHR. Ph. (07) 375 5629 anytime.

Yaesu FT-DX400 transceiver, 10 m through 80 m, with cooling fan attached, good condition, handbook $350, VK2AGS, QTHR. Ph. (02) 93 4170 A.H.; (02) 438 9281 Bus.

AX 190 communications Rx, 15 months old, as new condition $170. Dx 160 general coverage Rx $100. Graham VK2ACT/NFW. Ph. (02) 871 2651 A.H.; (02) 240 7391 Bus.

Atlas 215 solid state transceiver, also Atlas AC power console, spare set IC's, handbook, Asahi set of centre loaded whips 80-10 m, excellent condition $685. M. Glover VK7MG, 2/292 Sandy Bay Road, Sandy Bay, Tas., 7005.

Two new dual beam CRO tubes, Philips type DHM 10-93, kept as spare for BWD420 CRO, $50 each, pack frt. ins. free. VK2ZKV. K. J. Cox, 31 Pell Street, Howlong, 2640, N.S.W.

Alpha 374 80-11-10 m self contained desk top bandpass linear power amplifier, no tune up, in-Eimac 8874 ceramic triodes, 3 kW PEP SSB voice, stant band change or manual tune up, uses three 1.2 kW carrir continuous duty, brand new in factory carton $2100. James Goodger, VK2JO. Ph. (02) 36 2981.

Brand new Atlas 210X solid state SSB transceiver with noise blanker, Atlas 240 V deluxe AC console speaker, Atlas deluxe mobile mount, Atlas 10X xtl. osc., Shure 404 mic., Mark anixer helical mobile antennas for 80-40-20 m with mobile base. All equipment brand new in factory sealed cartons, $1250. James Goodger, VK2JO. Ph. (02) 36 2981.

SILENT KEYS

It is with deep regret that we record the passing of —

Mr. V. BARNES	**ex VK3OT**
Mr. J. I. KELLEHER	**VK3AIJ**
Mr. A. D. KERR	**VK3JQ**
Mr. G. W. REID	**VK2OW**
SID. C. BAKER	**VK3BK**

Sadly our good friend Sid. passed away on 14th July, 1977.

Amateur Radio was Sid's life, and he enjoyed the many QSOs with his Amateur friends to the full

Sid was licensed in 1925 and came on the air with a UV201 and Heising modulation. Bands used were 80 Mx and 200 Mx, with entertainment on Suday mornings with Pianola and Vocals by local friends.

Many of the early radio tests from aircraft were one of Sid's involvements. He kept up with new developments and applied them to his Amateur projects.

Sid., we will all miss you.

VK3AN

Hills TM13S/450-470 Yagis, stainless steel, 12 trigonal reflectors, fwd gain 15.3 dB at 460 FNT/BK ratio 31 dB; VSWR 1.3:1; type N. terr tion; weight 21.5 lbs.; windloading at 120 mp lbs.; as new $165 o.n.o. VK4M1, QTHR. Ph. (07) 44 7044 Bus.

WANTED

30L1 Collins Linear, any condition. VK4LN, QTHR.

Want to update from Spark to Silicon? Will swap approx. 500 TTL ICs for a Vibroplex keyer (bug). VK5EM (QTHR as VK5ZCP).

FT 401, 560, 570, 101, 200 type transceiver. Please send all particulars to A. J. Smith VK4ZFM, 3 Belbora Rd., Shailers Park, Qld. 4128. Ph. (07) 209 8105.

Hy-gain "Hy-Tower" Model 18HT, 80 through 10m vertical antenna. VK2BFJ, 90 Wyong Road, Killarney Vale, NSW 2261. Ph. (043) 32 5758 all hours.

Mini-Products Hybrid Quad Antenna 6-10-15-20m. Details and price to Ken VK6ZA, Box 768, Carnarvon 6701. Ph. (099) 41 1001.

HF Transceiver FV50, FT200 etc., also crystals to suit Vinten MTR13. Ph. (03) 541 3535.

Kokusai mechanical filter type MF-455-10K or suitable alternative. Advise cost or a distributor. J. Brinkman VK21S, 61 Gundagai St., Coffs Harbour 2450.

HF/VHF, AM/FM modulation meter. Please advise price and details to Peter Birrell VK5ZTT, Box 261, Mt. Gambier, 5290.

Schematic and xtal data for CPRC26 50 MHz able, used formerly by AIF, RAAF. Manufac d by Rogers Majestic in Canada, circa 1955. Duane VK2VE. Ph. (02) 665 9206, QTHR.

FT101B in good cond., complete. VK3EB, QTHR. Ph. (03) 41 5037 Bus.

FL1000 linear amplifier and TH33 jr. beam. VK3AHG. Ph. (03) 288 2024.

Some kind amateur in Perth willing to coach a keen SWL (with some knowledge) to obtain his callsign, willing to pay. Ring Don 74 1175.

To complete 108 Tcr. Microphone, H'set, No. 9 and 10 plugs, manual or circuit. To complete type 3 Mk. II, key, H'set, any other of spares. C. Gracie, Caverdish P.O. 3408.

430-530 MHz or better signal, gen. preferably in good working condition. Replies VK3AH, QTHR.

DV21 or DV21A for use with Icom IC21A. VK3ARZ, 769 High St. Road, Glen Waverley, 3150. Ph. (03) 232 9492.

Hide or buy ZL repeater crystals for Ken KP202. VK6JP, 14 Henley Road, Mt. Pleasant, W.A., 6153. Ph. (092) 64 1779

BFO for Trio 9R59D and help in installing it by someone in my area. Am also collector 78 r.p.m. records, willing purchase, good prices, suit my collection. Please write Barrie Boyce, L30425, 146 Abbott Street, Sandringham, 3191.

ELECTRONIC ENTHUSIASTS EMPORIUM

POPULAR INTEGRATED CIRCUITS IN STOCK

CA3012	4.60
CA3013	5.80
CA3018	3.50
CA3023	6.80
CA3028A	2.60
CA3035	5.20
CA3039	2.10
CA3046	LM3046
CA3053	1.70
CA3059	8.40
CA3060	8.40
CA3079	4.40
CA3080	2.10
CA3081	2.70
CA3082	2.70
CA3083	2.90
CA3086	LM3086
CA3089E	2.90
CA3090Q	6.90
CA3091	18.00
CA3120E	4.50
CA3127E	4.50
CA3128E	9.90
CA3130T	2.25
CA3140T	2.25
CA3600	3.30
CD4000	.55
CD4001	.55
CD4002	.55
CD4006	2.30
CD4007	.55
CD4008	2.35
CD4009	1.50
CD4010	1.50
CD4011	.55
CD4012	.55
CD4013	.90
CD4014	2.40
CD4015	2.40
CD4016	.90
CD4017	2.25
CD4018	2.25
CD4019	2.25
CD4020	2.50
CD4021	2.25
CD4022	2.15
CD4023	.55
CD4024	1.75
CD4025	.55

CD4026	3.30
CD4027	1.05
CD4028	1.80
CD4029	2.65
CD4030	.95
CD4031	4.70
CD4035	2.35
CD4040	2.50
CD4041	2.50
CD4042	1.95
CD4043	2.25
CD4044	2.25
CD4045	3.20
CD4046	3.20
CD4047	1.95
CD4049	.90
CD4050	.90
CD4051	2.25
CD4052	2.25
CD4053	2.25
CD4066	1.45
CD4068	.55
CD4069	.60
CD4070	.55
CD4071	.55
CD4072	.55
CD4075	.55
CD4076	1.25
CD4078	.55
CD4081	.55
CD4082	.55
CD4085	1.65
CD4086	1.65
CD4093	1.80
CD4502	2.70
CD4503	1.40
CD4510	3.20
CD4511	3.30
CD4514	6.50
CD4515	6.50
CD4516	3.20
CD4518	2.85
CD4519	1.35
CD4520	2.55
CD4528	1.80
CD4539	1.98
CD4555	1.80
CD4556	1.80
CD4720	12.60

CD4724	3.85
CD40097	1.80
CD40098	1.80
CD40174	2.90
CD40175	2.90
CD40192	2.90
CD40194	2.90
CD40195	2.90
DM8097	1.90
HEF see	"CD"
LH0070	6.20
LM114H	4.90
LM301AN	.95
LM301CN	.95
LM304H	3.80
LM305AH	3.80
LM307N	1.60
LM308V	2.20
LM309K	2.60
LM310N	3.90
LM311A	3.60
LM311H	3.60
LM312H	4.90
LM317K	6.90
LM318N	5.90
LM319H	7.25
LM319N	5.90
LM320K	6.90
LM320T	4.50
LM322N	4.50
LM323K	7.90
LM324N	4.50
LM325N	4.50
LM326H	4.50
LM339N	3.70
LM340K	4.95
LM340T	2.70
LM349N	4.50
LM358N	3.20
LM370H	4.95
LM371N	3.90
LM372H	7.50
LM372N	4.50
LM373N	4.70
LM374N	4.90
LM375N	4.90
LM377N	3.50
LM379	7.50

LM380N	2.75
LM381N	3.20
LM382N	2.60
LM387N	2.75
LM395K	6.90
LM555CN	1.20
LM555H	1.95
LM556N	2.95
LM562B	10.90
LM565N	3.50
LM566CN	2.50
LM567CN	3.50
LM709N	.95
LM710CN	1.25
LM710CH	
LM723H	1.70
LM723N	1.25
LM725N	5.90
LM733CH	2.70
LM733N	2.50
LM741CH	1.20
LM741CN	.75
LM747CH	2.70
LM747CN	2.50
LM748CN	1.20
LM1303N	2.60
LM1310N	3.50
LM1458N	2.50
LM1488N	6.90
LM1489N	5.75
LM1496N	1.90
LM1808N	3.90
LM3028	CA3028
LM3046	3.60
LM3086	3.75
LM3900	1.75
LM3905	3.90
LM3909	1.50
MC1035P	2.90
MC1312P	4.80
MC1314P	6.90
MC1315P	10.75
MC1350P	1.95
MC1351P	3.60
MC1454G	5.40
MC1458	LM1458
MC1468L	6.50
MC1488	LM1488

MC1496K	2.75
MC1590G	6.75
MC14553	12.50
MC1648P	4.90
MC4044P	4.90
OM802	3.20
SAJ110	2.50
SAK140	2.50
SD305DE	1.30
SD306DE	1.50
SL415A	2.70
SD425A	1.80
SL437D	3.60
SL440	1.90
SL442	2.90
SL447	4.90
SL449	1.60
SL610C	7.25
SL612C	7.25
SL613C	12.50
SL620C	9.50
SL621C	9.50
SL623C	17.40
SL622C	26.90
SL624C	8.80
SL630C	6.90
SL640C	10.60
SL641C	10.60
SL645C	12.60
SL901B	3.90
SL917B	6.50
SL1310	1.60
SL3046	1.20
SP8505	8.60
SP8515	12.90
TAA300	2.90
TBA570	2.90
TBA700	4.90
TBA810A	4.90
TB1750A	3.90
TCA220	2.25
TCA290A	4.90
TCA420A	4.90
TCA580	6.50
TCA730	6.90
TCA740	6.80
TDA1005	5.50
UAA170	3.25

UAA180	3.25
UA723C	LM723
UA757	3.80
ULN2208	2.45
ULN2209	2.45
ULN2111	2.10
74C00	.55
74C02	.80
74C04	.55
74C10	.65
74C14	2.80
74C20	.75
74C85	3.90
74C86	2.00
74C90	2.50
74C154	5.70
74C160	3.60
74C162	4.50
74C174	2.50
74C192	2.80
74C901	1.95
74C925	16.70
80C95	2.20
MISC	
AL5352	1.50
GL4484	1.80
GL5253	.90
OL31	.90
RL4484	.39
RL5023	.35
FND357	3.50
FND500	3.50
9001	1.80
9368	3.85
9601	2.90
NSN71	2.90
NSN74	2.90
TIL306A	
11C90	18.50
95H90	14.50
2102-2	3.75
2513N	17.50
S1883	
S50242	15.00
MA1002	13.50
7805CP	2.90
7824CP	

In some cases pin for pin substitutes will be supplied.

POPULAR SEMI-CONDUCTORS STOCKED

7400	.48
7401	.48
7402	.48
7403	.48
7404	.48
7405	.48
7406	1.09
7407	1.09
7408	1.09
7409	.48
7410	.48
7411	.54
7413	1.15
7414	2.70
7416	1.00
7417	1.15
7420	.48
7422	1.95
7425	.95
7426	.70
7427	.66
7430	.48
7432	.66
7437	.90
7438	.90
7440	.48
7441	2.80
7442	2.60
7445	2.60
7446	2.60
7447	2.60
7448	2.60
7450	.48
7451	.48
7453	.48
7454	.48
7460	.48
7470	.85
7472	.75
7473	.80
7474	.95
7475	1.35
7476	.90
7480	1.60
7482	2.30

7483	2.30
7485	2.95
7486	.85
7489	4.50
7490	.90
7491	1.90
7492	1.20
7493	1.20
7494	2.20
7495	1.65
7496	2.15
74100	3.65
74107	.95
74121	1.20
74122	1.20
74123	1.40
74132	1.90
74141	2.75
74145	2.95
74150	3.25
74151	2.20
74153	1.95
74154	3.20
74157	2.20
74160	2.75
74164	2.90
74165	2.90
74174	2.90
74180	2.90
74181	5.95
74185	4.90
74190	3.20
74177	2.90
74191	2.90
74192	2.75
74193	2.75
74194	2.50
74195	1.90
74196	2.90
74S00	1.50
74S10	1.75
74S20	1.75
74S74	3.50
74S112	3.20
74S251	5.30

74S258	4.75
74S196	7.50
82S23	6.95
8281A	3.90
82S90	7.50
74LS00	.55
74LS01	.55
74LS02	.55
74LS03	.55
74LS04	.65
74LS08	.55
74LS09	.55
74LS10	.60
74LS11	.55
74LS13	1.20
74LS14	2.95
74LS20	.55
74LS21	.55
74LS22	
74LS27	.60
74LS28	.60
74LS30	.55
74LS32	.70
74LS37	.70
74LS38	.70
74LS40	.65
74LS42	2.20
74LS73	.75
74LS74	.90
74LS75	1.20
74LS78	.75
74LS86	.95
74LS90	1.95
74LS92	1.95
74LS93	1.95
74LS95	2.60
74LS109	.85
74LS113	.85
74LS114	.85
74LS151	2.60
74LS153	
74LS157	2.40
74LS163	3.95
74LS163	3.95
75LS164	2.90

74LS174	2.70
74LS175	2.70
74LS181	6.50
74LS191	4.50
74LS192	4.50
74LS193	4.50
74LS194	2.60
74LS195	2.60
74LS196	2.60
74LS221	2.50
74LS253	2.75
SEMICONDS	
AC125	1.80
AC126	1.80
AC127	1.80
AC128	1.80
AC132	1.50
AC187	1.50
AC188	1.50
AD149	2.60
AD161/62	4.50
AS322	.18
AT1138	2N301
ASY17	2.65
BC107	.35
BC108	.35
BC109	.35
BC177	.40
BC178	.40
BC179	.40
BC182	.40
BC212	.50
BC327	.55
BC337	.55
BC547	.55
BC548	.55
BC549C	.55
BC559	.55
BC639	1.20
BC640	1.20
BD131	1.20
BD132	1.60
BD139	1.20
BD140	1.20
BD237	1.80

BD238	1.80
BD437	2.80
BD438	2.80
BF173	1.25
BF180	1.20
BF194	.85
BF200	1.30
BFY50	1.20
BFY51	1.50
BPX25	4.90
BSX19	.75
BU126	3.85
MFE131	1.95
MJ802	8.90
MJ2955	2.60
MJ4502	8.90
MPF102	.65
MPF103	.85
MPF104	1.10
MPF105	.65
MPF106	1.15
MPF121	1.60
MPF603	6.90
TIP31C	1.20
TIP32C	1.30
TIP120	3.20
TIP125	3.30
TIP141	4.70
TIP2955	1.70
TIP3055	1.70
TT800	2N4037
TT801	1.20
2N301	2N2869
2N706A	1.20
2N918	1.60
2N2222A	1.20
2N2646	2.50
2N2869	2.70
2N2904A	1.50
2N2905	1.20
2N3053	1.20
2N3054	1.70
2N3055	1.35
2N3564	.65
2N3565	.55

2N3566	.95
2N3568	.95
2N3569	.50
2N3638	.55
2N3638A	.60
2N3642	.55
2N3643	.55
2N3694	.65
2N3731	5.95
2N3819	1.35
2N3866	2.75
2N4037	1.25
2N4249	.65
2N4250	.65
2N4355	.65
2N4356	.65
2N4360	.95
2N5245	.75
2N5457	MPF103
2N5458	MPF104
2N5459	MPF105
2N5485	MPF106
2N5590	MPF603
2N5591	11.30
2N6027	1.35
2N6084	21.00
BA102	.80
OA47	.60
OA90	.35
OA91	.35
5082-2800	3.20
40440	2N3731
40637A	2.85
40673	1.95
40822	2.90
40841	1.90
BZX61	.75
BZX79	.42
BZX70	1.50
BZY93	2.60
BZY91	12.50
PA40	5.85
PB60	6.50
MEL12	1.40
FCD820	1.90

PC BOARD

FIBREGLASS —

4" x 3" S.S.	.75
6" x 4" S.S.	1.20
8" x 3" S.S.	1.20
6" x 6" S.S.	1.60
8" x 6" S.S.	2.20
12" x 4" D.S.	2.90
12" x 12" D.S.	6.00
6M CONVERT	2.50
2M CONVERT	2.50

DIP SOCKETS

8 PIN	.45
14 PIN	.48
16 PIN	.54
24 PIN	.95
40 PIN	1.50

TOROIDS, etc.

IRRESPECTIVE OF MIX

T-12	.70
T-25	.75
T-37	.80
T-50	.85
T-68	.95
T-80	1.10
T-94	1.50

Free Data on request.

COIL FORMS

NEOSID772/1	.20
5027/6PLB	.20
7100CAN	.20
5200/8PLB	.25
7300CAN	.25
F16 or F29	.12

MISCELLANEOUS

SO239	1.95
PL259	1.95
BNC Pug	2.30
BNC Sockets	1.60
7 Seg Displays	2.50
Miller Coils	Indent
A.R.R.L. Publications	See E.T.I. or write

BOXES

108 x 108 x 50	2.75
216 x 108 x 50	3.75

INSTRUMENT BOX

160 x 160 x 70 (Black/White)	5.90

VALVES

6DQ5	7.25
6GK6	4.95
12BY7A	1.95
OD3	P.O.A.
7360	P.O.A.
*QQE06-40	34.90
*6146	8.90
*6146B	9.70
*6939	16.95
*4-125A	63.90
*4-250A	71.90
*6JS6	P.O.A.

* Indent only.

PUBLICATIONS

Write or Phone for latest list.

SEND NO MONEY

Where QTHR, simply order by mail or phone and pay on Invoice. No charges. No P/P under 500g (1 lb.).

SHOPS 2 & 3, POST OFFICE ARCADE, 7-10 JOYCE STREET, PENDLE HILL, N.S.W. 2145 — TELEPHONE 636-6222

MAIL: P.O. BOX 33, PENDLE HILL, N.S.W., 2145

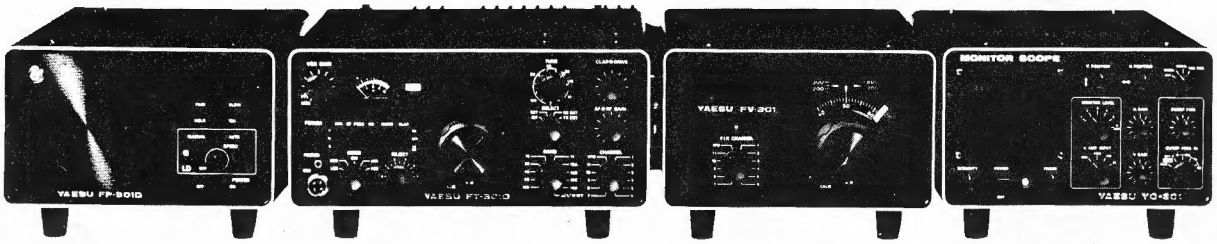
Mon., Tues., Wed. 9-5 — Thurs. 9-7 — Fri., 9-5 — Sat. 9-12

PLENTY OF PARKING AT REAR

STD 02

FT-301D

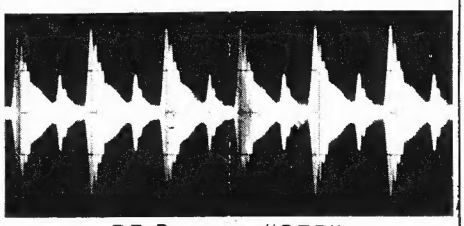
All Solid State Digital Readout HF Multi-Mode Transceiver



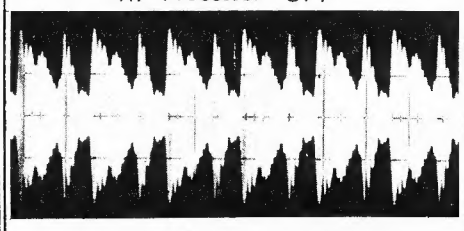
The FT-301D is an advanced fully solid state Digital Readout SSB, AM, FSK and CW transceiver covering 160mx thru 10mx including one auxiliary band and WWV. It has all the outstanding features of Yaesu's top performance FT-101E (inc. RF Processor) plus many more additions (Digital Readout, I.F. Rejection filter, & switchable AGC time constant).

RF. PROCESSOR

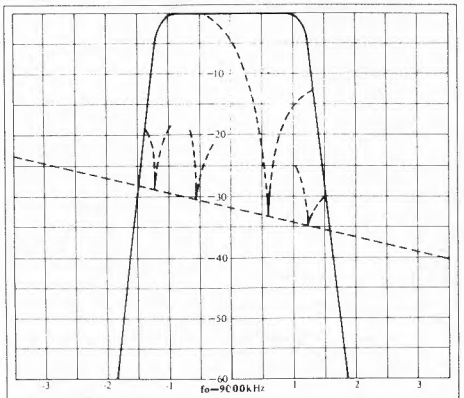
The RF Processor increases talk power to cut through the pile-ups without addition of a linear amplifier.



RF Processor "OFF"



RF Processor "ON"



REJECTION TUNING

FEATURES

- ALL Solid State — 27 IC, 47 TR, 24 FET and 94 diode.
- ALL Band — 160 through 10 meter plus receive only for WWV/JJY
- ALL Modes — SSB (USB/LSB selectable) CW, AM and FSK.
- Digital Dial Readout — by large LED diode.
- 200 Watts PEP INPUT for SSB, CW and 50 Watts for AM, FSK.
- RF Feedback — for clean signal.
- Rejection Tuning — tunable crystal filter rejection.
- Effective Noise Blanker — for elimination of noise spikes.
- RF Speech Processor — for increased talk power.
- Built-in fully adjustable VOX.
- Automatic break-in CW operation with sidetone.
- Selectable 25 kHz/100 kHz calibrator, ± 5 kHz TX/RX or RX clarifier with separate ON-OFF switch.
- Selectable, amplified AGC system — SLOW, MEDIUM and FAST.
- Built-in internal crystal control (11 channels) provision and dual VFO adaptor.
- Adjustable carrier level for tune-up and novice operation.
- Triple protection circuits for PA stage and warning system.
- 8-pole SSB filter for unparalleled selectivity.
- Built-in speaker.
- Compact size, light weight
- Complete line of compatible accessories for flexible station design.

TECHNICAL DATA

GENERAL

Frequency Range: 1.8—2.0 MHz, 3.5—4.0 MHz, 7.0—7.5 MHz, 14.0—14.5 MHz, 21.0—21.5 MHz, 27.0—27.5 MHz, 28.0—29.9 MHz, WWV 5 MHz (receive only).
Mode: SSB (selectable USB or LSB), CW, AM or FSK.
Frequency Stability: Within 100 Hz during any 30 minute period after warm-up. Not more than 100 Hz with 10% line voltage variation.
Calibration Accuracy: 2 kHz maximum after 100 kHz calibration.
Backlash: Not more than 50 Hz.
Antenna Impedance: 50 ohm unbalanced nominal.
Circuitry: 24 FETs, 47 Transistors, 27 Integrated Circuits and 94 Diodes.
Power Requirements: 13.5 V DC nominal. 1.1 A (digital type) and 0.9 A (dial type) for receive and 21 A for transmit.
Size: 280(W) x 125(H) x 270(D) m/m.
Weight: Approx. 9 kg.

TRANSMITTER

Input Power: 200 Watts PEP on SSB, 200 Watts on CW at 50% duty cycle and 50 Watts on AM and FSK. (Slightly lower on 10 meter and 160 meter bands.)
Microphone: 500 ohm dynamic type.
Carrier Suppression: —40 dB.
Sideband Suppression: —50 dB.
Spurious Radiation: —40 dB.
Distortion Products: —31 dB.
Frequency Response: 300 to 2700 Hz ± 3 dB.
Final Transistor: S2535 x 2.

RECEIVER

Sensitivity: 0.25 μ V for 10 dB Noise plus Signal to Noise Ratio on 14 MHz.
Selectivity: 2.4 kHz nominal bandwidth at 6 dB down, 4.0 kHz at 60 dB down on SSB, CW and AM. 600 Hz nominal bandwidth at 6 dB down, 1.2 kHz at 60 dB down with optional CW filter, 6 kHz nominal bandwidth at 6 dB down, 12 kHz at 60 dB down with optional AM filter.
Harmonic & Other Spurious Response: Image Rejection better than 50 dB. Internal Spurious Signal below 1 μ V equivalent to antenna input.
Automatic Gain Control: AGC threshold nominal 3 μ V. Attack time is 8 milli-seconds and release time is selected from 3500, 1500 and 200 milli-second on front panel.
Audio Noise Level: Not less than 40 dB below 1 Watt.
Audio Output: 3 Watts to internal or external speaker at 4 ohm impedance.
Audio Distortion: Less than 10% at 3 Watts output.

FT-301D Accessories everything you want in a complete home station design.

YAESU's years of experience in the radio amateur field are exemplified in the FT-301D series. The FT-301D can be interconnected to its matching power supply and external VFO unit. This feature provides you with a completely integrated home station with transceive operation on either VFO split frequency, or, crystal controlled operation with a flip of the switch. The FP-301D with built-in speaker is a complete AC power supply and can be used for any of the following supply voltages: 100/110/117/200/220/234 Volts, 50/60 Hz. A digital clock and automatic call sign identifier are an integral part of the power supply. The time display can be selected for either a 24-hour or 12-hour system with a flip of the switch on the front panel. A programmable identifier transmits your call sign in morse code automatically every ten minutes.

- **AC Power Supply FP-301D**
- **AC Power Supply FP-301**
- **External VFO FV-301**
- **Monitor Scope YO-301**

TUNABLE REJECTION TUNING

The tunable IF rejection filter utilizes sharp resonance characteristics of a crystal filter. The resonance frequency is tunable over the entire IF range to reject any interferences close to or inside the IF pass-band.

PRICES	
FT-301D inc. AM Filter	$1147
FP-301	$169
FP-301D	$289
FV-301	$149
YO-301	$345

Above prices include S.T. Freight and Insurance is extra.
90 day warranty. Prices and specifications subject to change.

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